SKYWAYS

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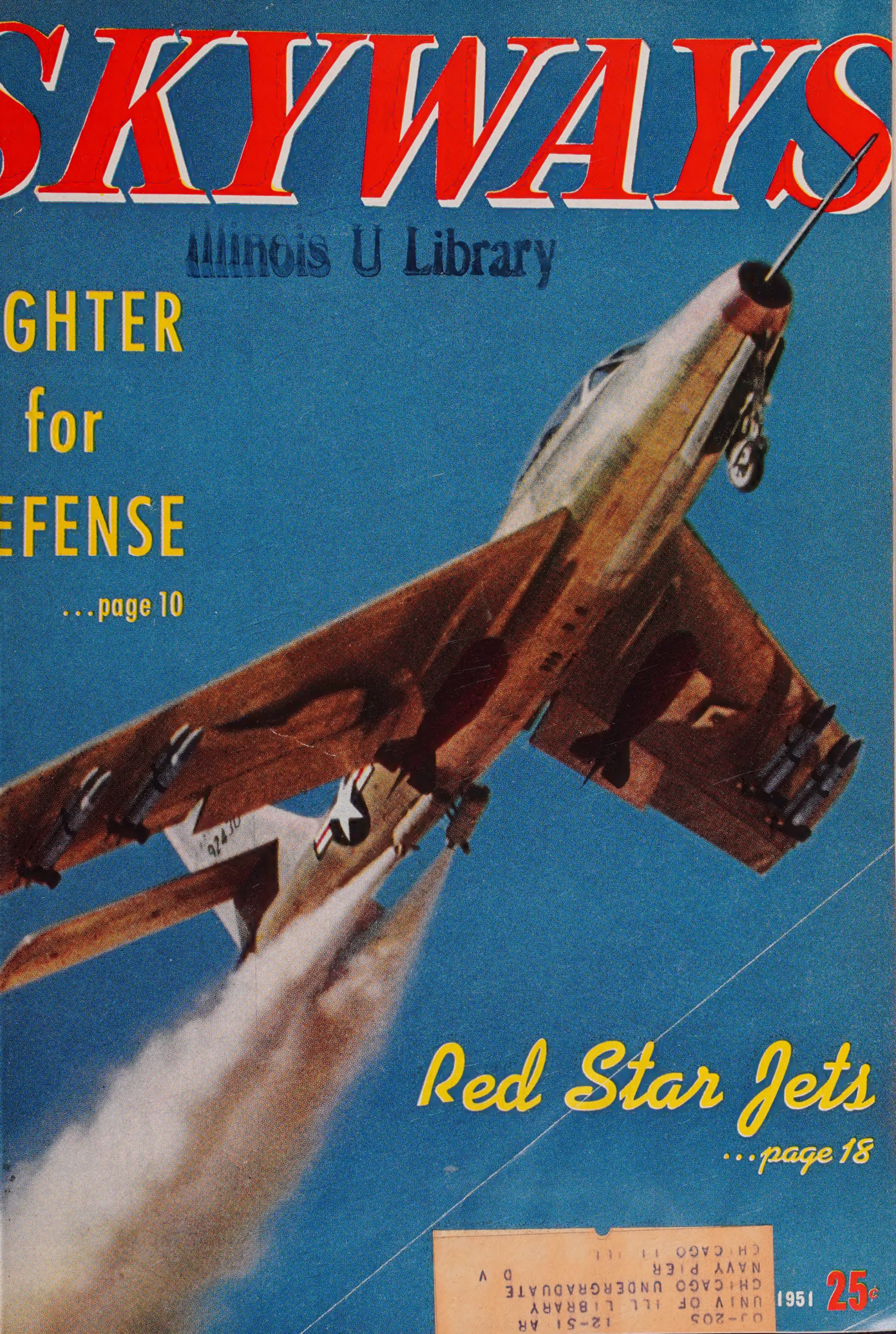

Red Star Jets

...page 18

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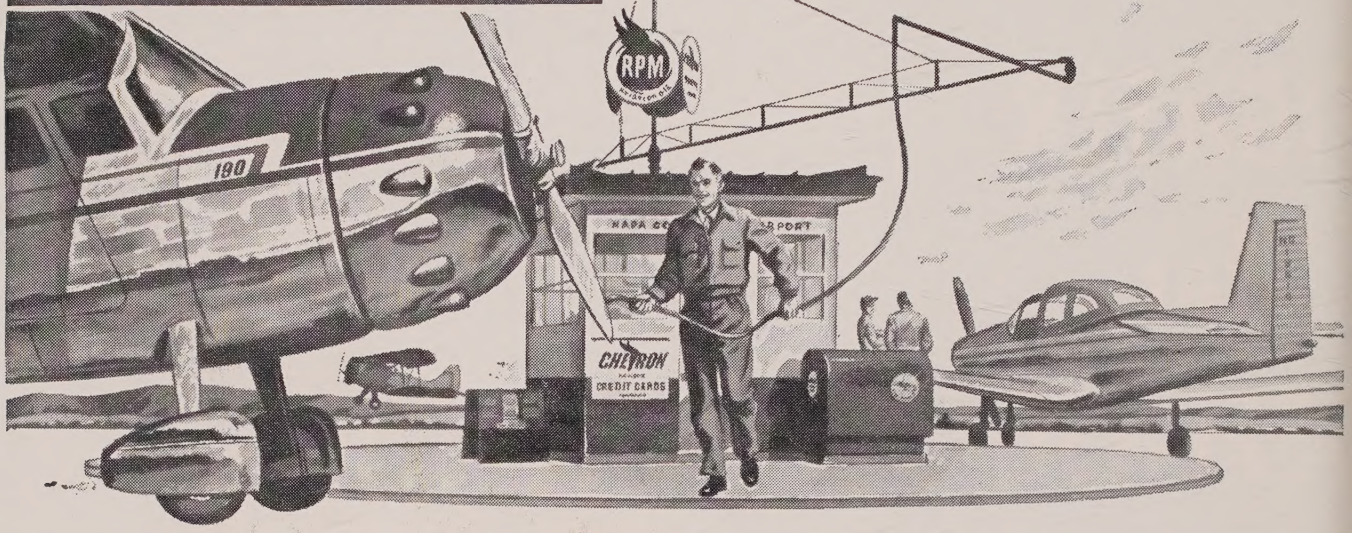


R. Bridgeford

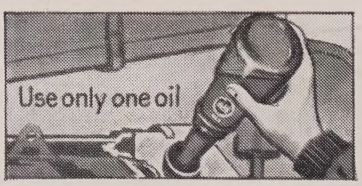
How to make planes last years longer

"With parts becoming precious, give your plane extra care so it won't need replacements," writes Dick Bridgeford, operator of Bridgeford Flying Service at Napa County Airport. "Here are several good rules on 'preventive maintenance' which will mean better, more pleasant flying . . .

1. "Save metal surfaces by polishing out pits. When preflighting, check metal surfaces for corrosion. If pitted, clean with a good abrasive and polish with heavy paste wax. Otherwise corrosion goes deep, weakens the metal.

2. "Spot engine trouble before it starts—through the 25-hour check. For example, excessive steel filings in the screen indicate that your camshaft or gears may be wearing out. Since we started checking engines every 25 hours and using only RPM Aviation Oil, we've had minimum wear—and not one stuck valve in 23,000 hours.

3. "Use only one oil. It's a good idea to stay with a *compounded* aviation oil that keeps engines clean. We use only one type oil, compounded RPM Aviation Oil. With 'RPM,' we average about 1250 hours between major overhauls . . . and most of that time is for student instruction—the roughest treatment you can give an engine because there are so many take-offs.



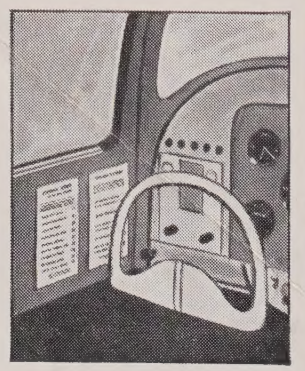
4. "Warm-up long enough. Most planes need three to five minutes warm-up at low rpm before taxiing out to take off. If oil pressure doesn't come up in 30 seconds, shut down and find out why."

TIP OF THE MONTH

Post a cockpit check-list

"For greater safety and longer engine life, type out a check-list which covers: Before starting; before take-off; before landing. Then tape it in the plane . . . and *follow* it!"

DICK BRIDGEFORD



CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

Standard Oil Company of California

SKYWAYS

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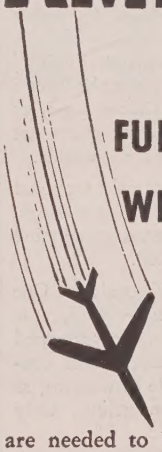

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AIR YOUR VIEWS

Farewell, The Jug

Gentlemen:
I enjoyed the article "Farewell, The Jug," by Sgt. S. E. Tunrer. I thought it expertly written. Though the exit of the *Thunderbolt* is eventually inevitable, reading this little story makes one sit down and think back over the war and that ship's part in it. "Farewell, The Jug" hit me somewhat unprepared for such reading, and left me darned sad about it all. I don't see how, if the F-51 is still being made good use of in air-to-ground fighting and the B-26 is proving quite invaluable in the Korean air operations, can the Air Force declare the 47-N obsolete? It may not be fast (as jets go), but it certainly is maneuverable and its range can be extended.

In the same issue as this story you printed a reader's letter inquiring about the effectiveness of the *Mustang* against the MIG-15. In your answer you mentioned the same principle which, I believe, is incorporated in the F-47N and it could be pitted against faster jet opponents. How about employing a turboprop in a newer, same-sized "Jug?" It seems to me there'd be plenty of room in that sleek hulk of a fuselage.

The F-47 is too good to go!

DON B. VICTOR
Beverly Hills, California

A lot of able airmen share your F-47 opinions, Mr. Victor. However, time flies by and good airplanes point the way to even better airplanes. In the case of the Thunderbolt, *for example, the present Republic jet F-84 represents considerable aerodynamic advancement over the F-47. The company has made no comments regarding turboprop development, so we can't say whether anything along that line is being considered or not, but . . . if turboprop engines are being considered, it is our guess turboprops would be tried on the newer airplane, the F-84, rather than the '47.*—ED.

Hoppi-Copter

Gentlemen:
In a recent issue of SKYWAYS you ran a picture of a British helicopter known as the "Hoppi-Copter." Could you please let me have the address of that company?

D. W. HARRIS
Fairfield, Montana.

The Hoppi-Copter is made by Hoppi-Copter, Limited, 17A Christchurch Road, Bournemouth, Hants, England.—ED.

F4U-5 vs. F2G-1

Gentlemen:
How does the speed, firepower, etc., of the F4U-5 compare with the Goodyear F2G-1?

RICHARD NOTTURNO
Lynbrook, New York

During World War II, Goodyear built the FG-1 which was the Goodyear production version of the Chance Vought F4U-1. The F2G-1 was a development of the FG-1 and was generally similar to the FG-1 except for a redesigned fuselage with a blister-type cockpit canopy and a new powerplant section. The F4U-5 is the latest version of the F4U-1. The F2G-1 was powered by a Pratt and Whitney R-4360 engine with a take-off rating of 3,000 hp. Here's how the F2G and the F4U-5 line up:

F2G-1	*F4U-5*
P & W R-4360	*P & W R-2800*
3,000 hp	*2400 hp*
Top Speed: 428 mph	*over 450 mph*
Rate of climb: 7,000 fpm	*4800 fpm*

As far as armament is concerned, the F2G carried six machine guns in the wings, and eight rocket projectiles under the wings; the F4U-5 carries four 20-mm cannon, and eight rocket projectiles. —ED.

Stewardess Info

Gentlemen:
Please send me some information about being an airline stewardess.

M. L. KRYNOCK
Canton, Ohio

Most of the domestic airlines are now accepting applications for stewardess positions from business girls who have had experience in public contact work. Heretofore, applicants for airline stewardess positions had to be registered nurses or have had one or two years of college. Applicants today must be U.S. citizens, single, and from 21 to 26 years old. Maximum weight is 135 pounds; height, 5 feet 2 inches to 5 feet 7 inches. These are the requirements established by United Airlines that hires and trains about 200 stewardesses a year. Requirements of other airlines probably are similar. For more detailed information, might we suggest that you write to Airline Steward and Stewardesses Association, 3148 West 63rd Street, Chicago, 29, Illinois, or to the home offices of the individual airlines.

F-48F

Gentlemen:
Isn't that *Thunderjet* pictured on page 48 of the March isue an F-84F instead of an F-84E?

H. ROBICHAUX
Rayne, Louisiana

Forgive us a typographical error not caught in proofreading. The swept-wing version of the Thunderjet *is the F-84F and not the F-84E.*—ED.

Mach 1 Again

Gentlemen:
Could you please tell me the airspeed of Mach 1?

P. SACHS
Maplewood, New Jersey

Mach 1 is the relation between speed of an airplane and the speed of sound. In fact, the speed of sound is Mach 1 . . . or 763 mph at sea level; 663 mph at 35,000 feet. Mach 2 would be twice the speed of sound, and Mach .7 would be seven-tenths the speed of sound.—ED.

Tigercat

Gentlemen:
Could you give me some information regarding the twin-engined Grumman *Tigercat?* Is it designated F10F?

GEO. DUNN
Syracuse, New York

The Tigercat *was designated F7F, and was a twin-engine single, or two-seat fleet fighter powered by two P & W R-2800-22 engines. The latest production version was a single-seater that carried a lot of radar in its nose for night-fighter operations. The F7F-4N was the only model of the* Tigercat *approved for carrier operations. It had a top speed of 427 mph at 19,200 feet; rate of climb of 4,260 fpm; 36,000-foot service ceiling; and a normal range of 1,015 miles. The plane is not in production any longer. The F10F actually still is the XF10F, an experimental single-seater jet fighter.*—ED.

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TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

AIR FORCE navigators-in-training group around their instructor before taking off on a practice mission in the twin-engine T-29 designed and built by Consolidated

MILITARY AVIATION

Sapphire-Powered '84

The *Sapphire*-powered F-84F recently made its first flight at Edwards AFB, Muroc. The added thrust of more than 2,000 pounds over that of the previous engine (Allison J-35) gives the latest model *Thunderjet* a faster take-off, rate-of-climb and speed. The British-built *Sapphire* develops 7200 pounds thrust, and the American version (manufactured by Curtiss-Wright under license agreement with Armstrong Siddeley) will be installed in all production models of the F-84F. The 'F outperforms the 'E model in every category. The F-84E is presently in service in Korea and Germany, and deliveries are being made to North Atlantic Treaty Nations as part of the Mutual Defense Assistance program.

T-29's for Navigators

A fleet of 16 T-29 navigation trainers is now being used to turn out Air Force navigators at Ellington AFB, Houston, Texas. The T-29 is a twin-engine Consolidated Vultee aircraft specifically designed for navigational training. Ellington is the USAF's only navigation school, and today there are more than a thousand students assigned to Ellington AFB for training. Upon graduation these men will go to the Strategic Air Command (SAC) for duty as navigators on long-range bombers, or to the Military Air Transport Service (MATS) for duty on long-range transports. Some graduates will go to Mather AFB for specialized training that will make them triple-threaters: navigator-bombardier-radar observers.

Cutlass Ordered

The Navy has ordered a substantial quantity of Chance Vought F7U-3's, the twin-jet tailless fighter called *Cutlass*. Powered by two Westinghouse turbojets, the *Cutlass* is said to be in the "600-mph class."

Radio-Control Lifeboat

The Air Force's large A-3 lifeboat is joining the ranks of electronics. Now boasting radio control, the A-3 will do everything short of actually lifting "customers" out of the water. An operator in the plane which drops the boat simply maneuvers a stick on a small control box and takes over the remote operation of the A-3 as soon as it hits the water. The operator directs the lifeboat to the survivors, allows them to board, then sets the boat on course. Before development of the radio-controlled system, the A-3 was dropped in the vicinity of survivors, allowing for drift. The sea anchor held the lifeboat in place and, if all went well, the survivors drifted down to the boat. With the new system, the lifeboat comes to them. The A-3 is equipped with rations, survival equipment and gasoline enough to cruise 800 miles. The radio-control system going into the A-3 was developed by AMC's Equipment Laboratory and is being built by Westinghouse Electric.

Anti-Skid for Landing Gear

To reduce tire wear and landing roll, anti-skid devices are now being used on the Boeing B-47 and Martin XB-51, according to a report from officials at Wright-Patterson AFB, Dayton, Ohio. One of the devices, based on the relative speed of the wheel to an energy wheel, is manufactured by Westinghouse; the other, which uses a flywheel skid detector and a solenoid valve, is a Boeing development.

Both devices employ a valve to shut off pressure on the brake drum at the point where a skid begins, no matter the amount of pressure the pilot puts on the brake pedal. The Boeing anti-skid is called "Hytrol" and is being manufactured by Hydro-Aire, Inc., Los Angeles. The Westinghouse anti-skid is called "Decelostat." Both will be used on tricycle-gear planes as well as planes with the bicycle-type gear.

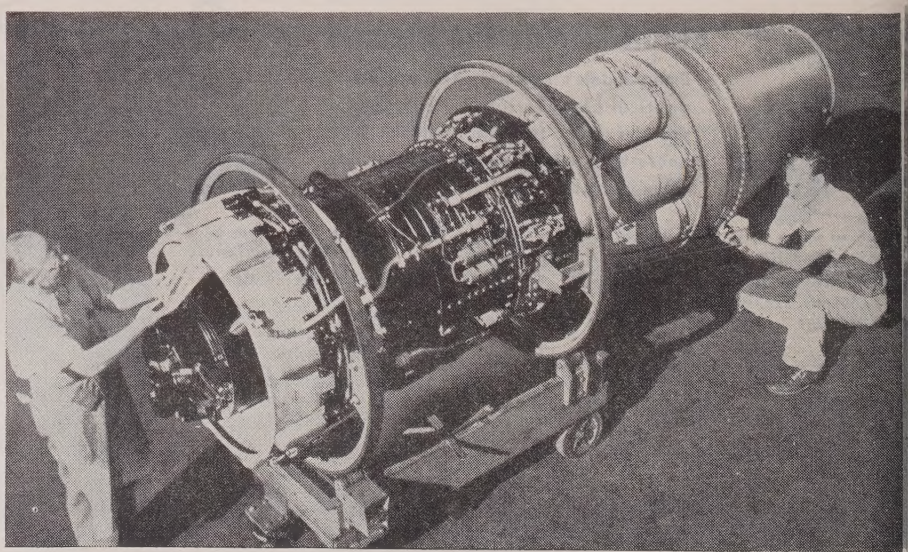
Evaluation Tests

Tests are currently being run at Eglin AFB to evaluate the Grumman SA-16, the Fairchild C-119, the Chase XC-123 and the Douglas Super DC-3 (military YC-129) to discover which meets the SAC's requirement for long-range rescue missions. Need is for a plane with 5,000-mile range as well as short take-off and landing.

Industry Notes

WESTINGHOUSE ELECTRIC announces

GENERAL ELECTRIC turbojet J-47 is to be built by Packard Motor Car Company for the Air Force. Packard's production will be entirely in the company's Detroit area factories



e appointment of Clarence Lynn as engi-ering manager of the Atomic Power Di-ion.

)O CORPORATION has received a sub-ıntial contract to build fins and rudders the Republic F-84 *Thunderjet*. Edo also s received a Navy contract to build a large antity of sonar devices for use on board ip to measure and record depth of water.

ENDIX RADIO has acquired Pimlico Air-rt at Baltimore to meet added space re-irements of an accelerated production pro-am. Forty acres of land, two hangars and veral smaller buildings make up the Ben-x-leased property. The buildings will be modeled for use as laboratories and class-oms for training AF personnel to maintain litary electronic equipment.

ASECKI reports Clarence B. Rex, former rtiss-Wright chief accountant, has joined asecki Helicopter, as Controller.

)OTS AIRCRAFT NUT CORPORATION nounced the election of Guy W. Vaughan its Board of Directors. General Ralph yce also was elected to Boots' Board of rectors.

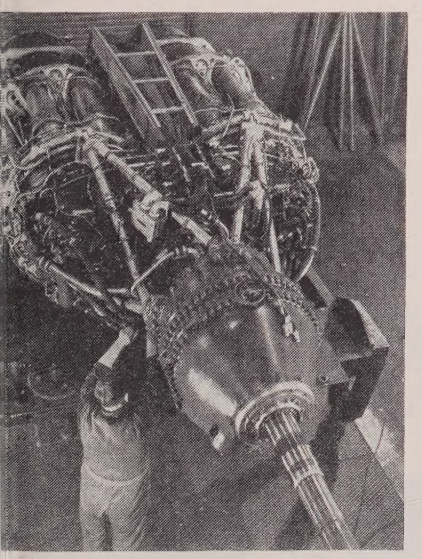
ENN L. MARTIN COMPANY recently nounced the election of William B. Bergen vice president-chief engineer.

)CKHEED AIRCRAFT CORPORATION s a new publicity manager. Ned Root, form-y managing editor of Air Force magazine, s been named publicity manager, and chard Bean as his assistant. Mr. Bean is former manager of publicity for the Los ngeles Chamber of Commerce.

RIGHT AERONAUTICAL has received large order from the Air Force for the *pphire* turbojet. The *Sapphire* is reported be the most powerful turbojet known to in production anywhere. This engine has en designated J-65 by the AF.

EPUBLIC has announced the appointment Herman Doege to the position of Director Republic-GM Assistance program.

ITISH flying boat *Princess* will have 10 stol Coupled *Proteus* turboprop units



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RECRUITING
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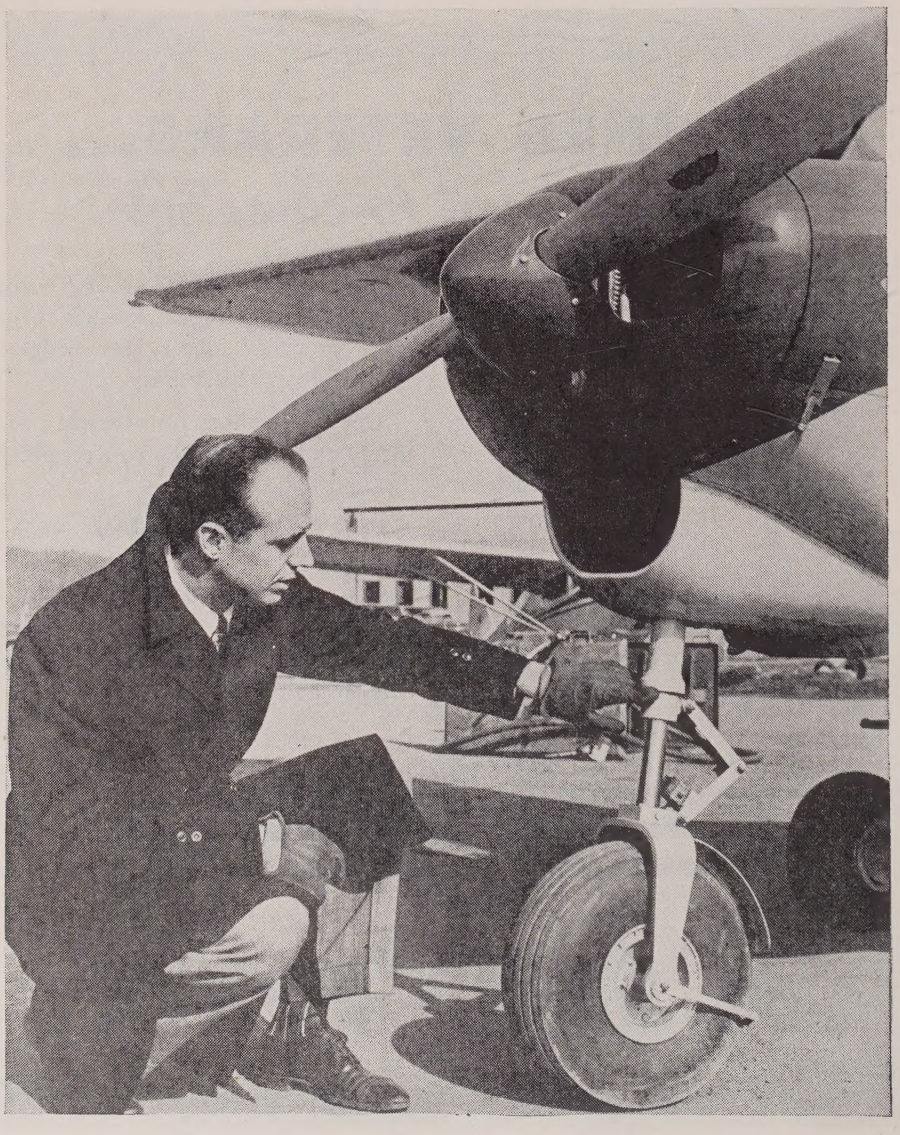
U. S. AIR FORCE

DOUGLAS AIRCRAFT recently purchased a Ryan *Navion* 260 as a utility plane to shuttle pilots, mechanics, etc., between plants



Hangar Flying

Whirler Light

Credit William S. Smoot, projector engi neer for Capital Airlines, for a new idea i aircraft running lights. The young enginee theorized that an airliner with a revolvin light atop the fuselage could be seen by a airport control tower at a greater distanc than an airliner equipped with standard run ning lights. To prove his point, Mr. Smoo borrowed two 50-watt sealed beam light from Federal Enterprises, a Chicago manu facturer. These he mounted back to bac on a vertical shaft, enclosed them in a amber dome and installed the assembly o a cargo plane. The lights were set to rotat 50 times a minute, thereby showing 10 sweeps each 60 seconds.

On the first flight of the Capital plane th Washington National Airport tower picke up the swiveling beacon 20 miles away. P for that distance under similar weather co ditions with the usual lights is six mile

Tests of the new lights are being run b the CAA and the Air Transport Associatio

Canada-U. S. Flights Simplified

Pilots of private and non-scheduled aircra are now finding it much simpler to enter t U. S. from Canada, as a result of an agre ment negotiated between the two gover ments. Instead of having to separately noti U. S. Customs and U. S. Immigration autho ties, a pilot now merely files a flight pla

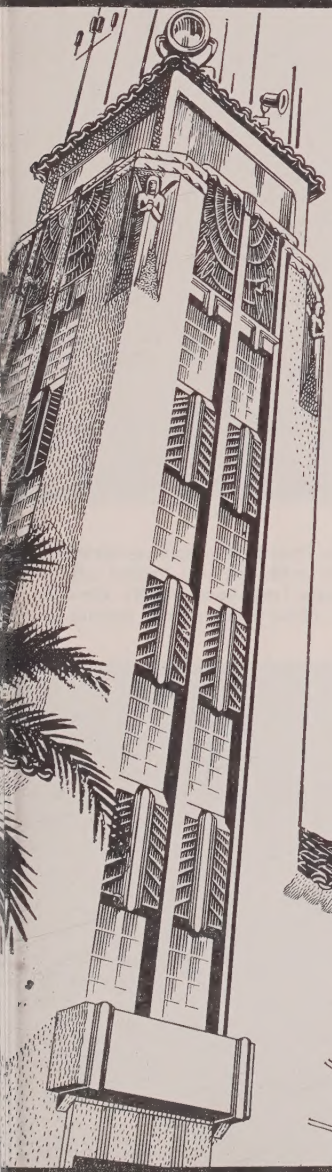
(*Continued on page 57*)

FAST LANDING TEST—Test Pilot Brad Smi okays nose gear of *Tri-Pacer* after tes which included landings at some 140 mp In all nearly 4,000 landings were mac

-Since 1929

TRAINING

IEN FOR AVIATION CAREERS



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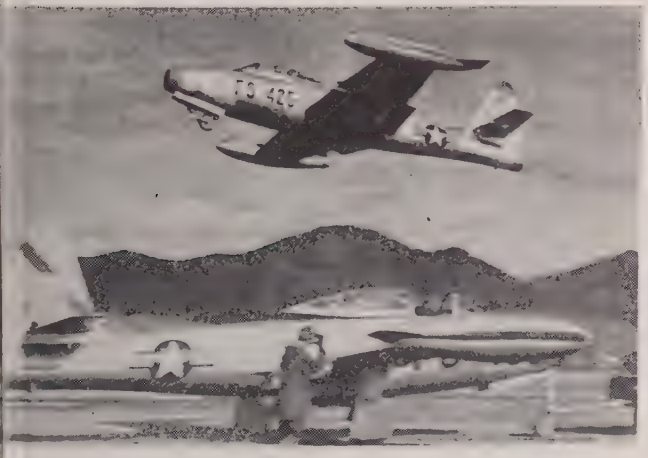
Air War in Korea

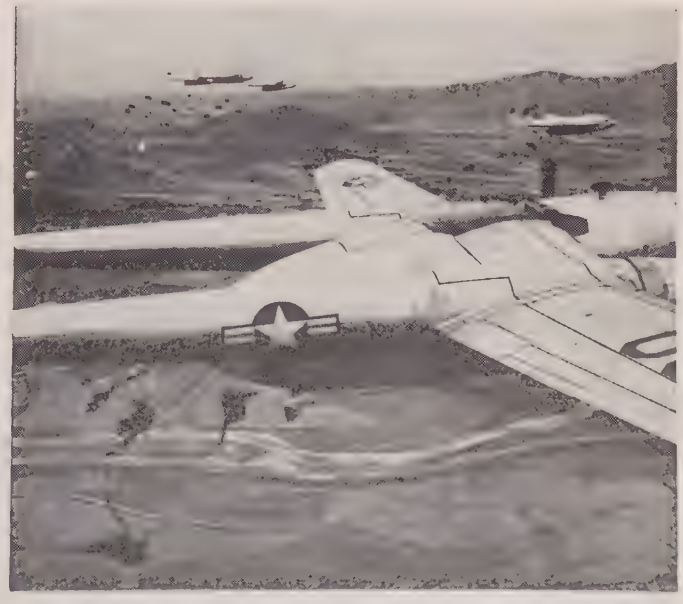
USS BOXER, one of the U.S. Navy's Essex-Class carriers, moves across San Francisco Bay on her way to San Diego where she will pick up her Air Group and then proceed to the Korean area. Note her crew standing at quarters

SABRE strikes at Communist troops in snow-covered Korean village. In this photo the F-86 has just peeled off for a screaming attack on Commie troop and supply concentrations in a Korean village. Note mountainous terrain

FAR EAST AIR FORCE transport sweeps low *(above)* over artillery crew firing on foe to the north. American paratroopers *(below)* jump from planes behind Commie lines in a move to trap thousands of retreating Korean Communists

BOMBS drop from lead B-29 as 19th Bomb Group hits enemy target *(above)* in Korean hills. *Thunderjet (below)* of the Far East Air Force zooms off runway for attack on Red forces. This F-84 *Thunderjet* is carrying rockets





PILOTS of 52nd Fighter All-Weather Wing run from Alert trailer to their fighters in response to simulated Alert call from area GCI station

HEAD of the Air Defense Command is Lt. Gen. E. Whitehead

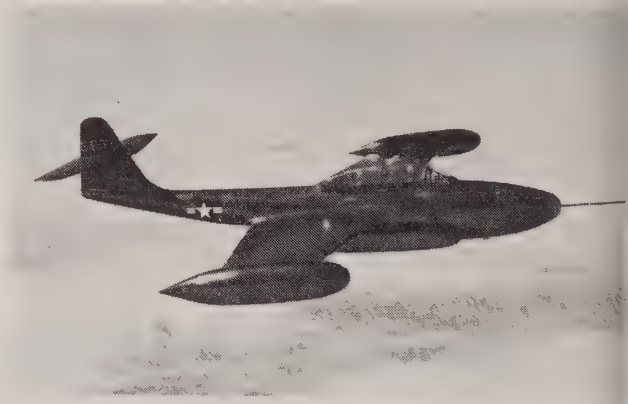
AIRCRAFT used by 52nd All-Weather Wing includes the Lockheed F-94 *(right)*, the Republic F-84 and the North American F-86 *Sabre*

ALL-WEATHER INTERCEPTOR in production for defense forces of the U.S. is the twin-jet Northrop F-89 *Scorpion*

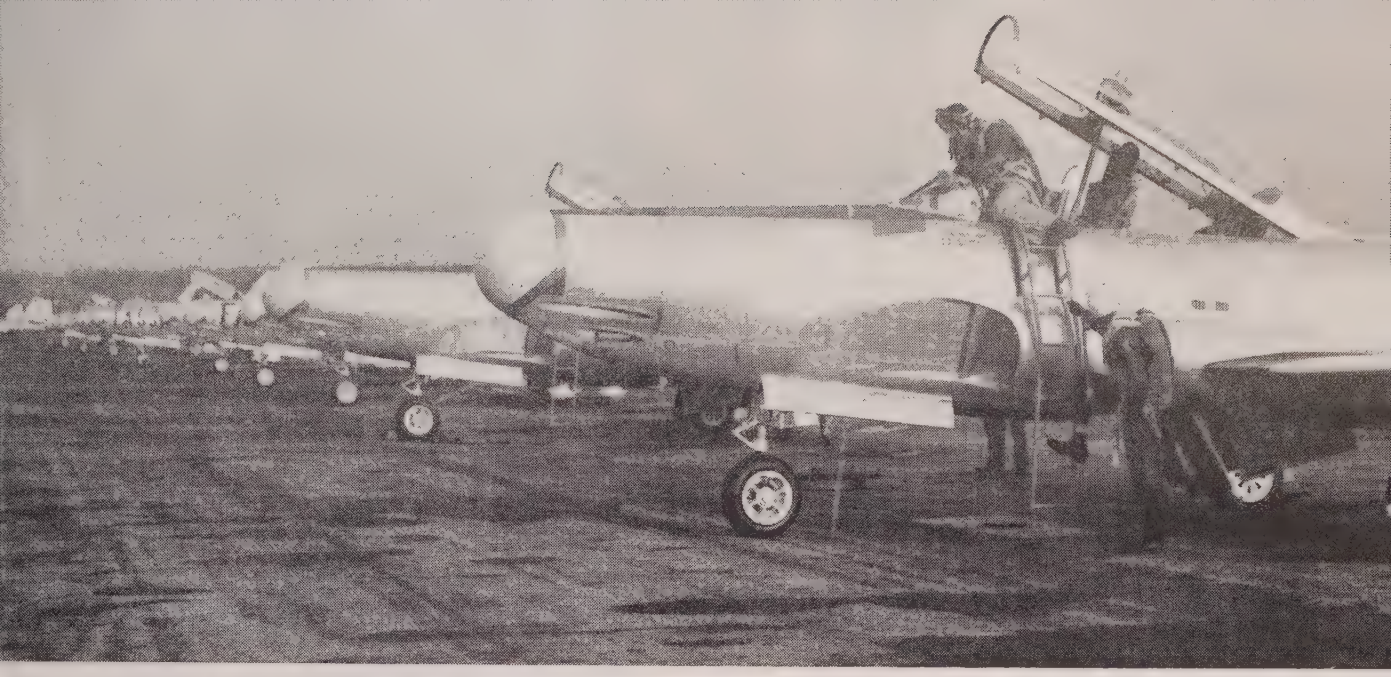
FIGHTERS for DEFENSE

Korean War and Soviet-developed A-Bomb sets Congressional and USAF wheels of defense turning rapidly

By COL. N. F. SILSBEE



THUNDERJET is day fighter assigned to air defense by the Air Force. This F-84 shown here is the 'E version



PILOTS AND RADAR OBSERVERS climb into cockpits of F-94's on the flight line at McGuire Air Force Base, New Jersey

DURING the past five years such Air Force leaders as Spaatz, Symington, Kenney, LeMay, Stratemeyer, Vandenberg and Finletter have insisted the United States is vulnerable to long-range air attack by the Russians. It may well be that for important strategic and logistical reasons the men of the Kremlin do not intend to launch a bombing attack this spring, but there is no question that the Soviet Air Force has the capability of making such an attack right now.

It was the full recognition of this attack capability by our top intelligence, the Joint Chiefs of Staff, National Security Council and the Armed Services Committees of Congress that resulted in a sudden reversal from four years of "economy" to "high priority" for the Air Defense System.

Two highly critical events gave added urgency to this decision. The first was the reported explosion of a Soviet-developed atom bomb at least a full year earlier than the "deadline" set by our atomic scientists for this achievement by the Russians. This changed the whole picture. When one enemy aircraft can carry against us the equivalent destructive power of 300 B-29 *Superfortresses* such as we employed against Japan from the Marianas in 1945, air defense against such bombers gets pretty close to top rating!

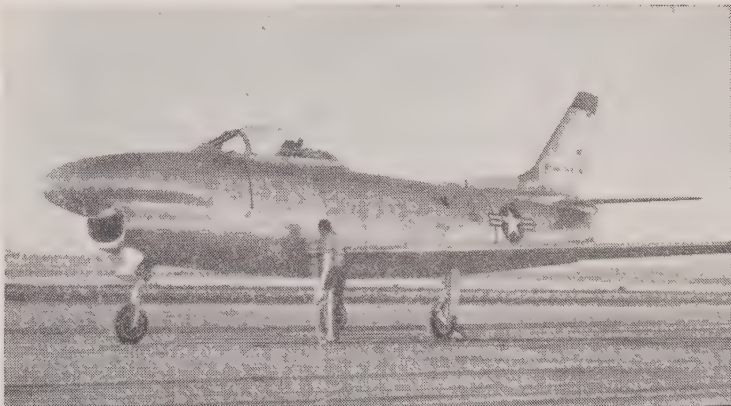
The other event was the outbreak of hostilities in Korea, with its inherent risk of starting World War III. This could very well mean the Kremlin had advanced its timetable, so that the 1952-53 deadline of the Finletter Report *Survival in the Air Age* was no longer a safe guidepost.

Among other changes brought about by these realizations, the vital air defense function (for which nearly $4 billion was appropriated in fiscal '51) was taken away from the Continental Air Command (ConAC), with its wide variety of chores, and given to a new Air Defense Command—a top-level command which was given full legal standing in early February.

The commanding general of ADF is Lt. Gen. Ennis C. Whitehead. Headquarters is at Colorado Springs. General Whitehead was Deputy Commander, then Commanding General of the Fifth Air Force from New Guinea to Okinawa. In March, 1946, he became CG of the Far East Air Forces, Tokyo. Three years later, after practically seven years of continuous duty in the Pacific (*Continued on page 12*)

AIR FORCE F-86 *Sabre* that has won fame for its flying, fighting in Korea has also been assigned to air defense

ANOTHER VERSION, F-86D with radar "snooper" nose, is being delivered to Air Force for air defense of U. S.



theater, he returned to the U. S. to become CG of the Continental Air Command.

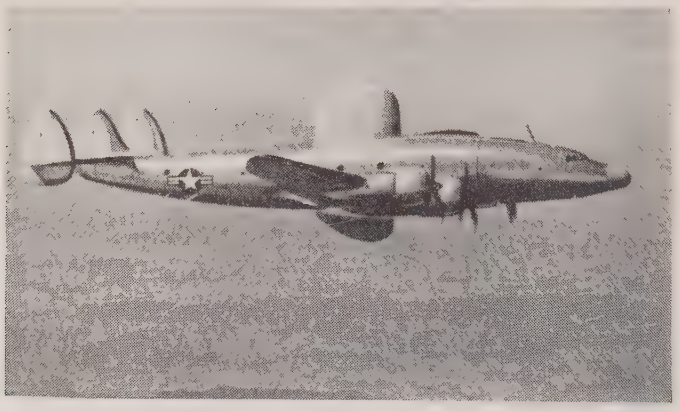
In June, 1950, ConAC was reorganized. The old Air Defense Command was inactivated and tactical air units were assigned to the Eastern and Western Air Defense Forces to better carry out the air defense mission. This division has been carried over into the new ADC.

Eastern Air Defense Force, with headquarters at Stewart AFB (near West Point), is headed by Maj. Gen. Frederic H. Smith, Jr., who served under Whitehead in the Fifth Air Force. EADF was assigned all of ConAC's fighter-interceptor and all-weather fighter wings in its area, which extends from the eastern seaboard to the 103rd meridian or as far west as the eastern slopes of the Rocky Mountains. Its bases include Stewart AFB, N. Y.; McGuire AFB, Fort Dix, N. J.; Otis AFB, Falmouth, Mass.; Langley AFB, Hampton, Va.; Selfridge AFB, Mt. Clemens, Mich.; and Oscoda AFB, also in Michigan. EADF is also responsible for installations at all radar sites and Air Defense Control Centers in its area.

The Western Air Defense Force has been commanded by Maj. Gen. Hugo P. Rush since December, 1949, with headquarters at Hamilton AFB, San Rafael, California. It was assigned ConAC's all-weather and fighter-interceptor wings in its area, which includes everything west of the 103rd meridian. Also all radar sites and ADCC. Bases assigned to WADF are Hamilton AFB and Victorville AFB, Calif., and Moses AFB and McChord AFB, Washington.

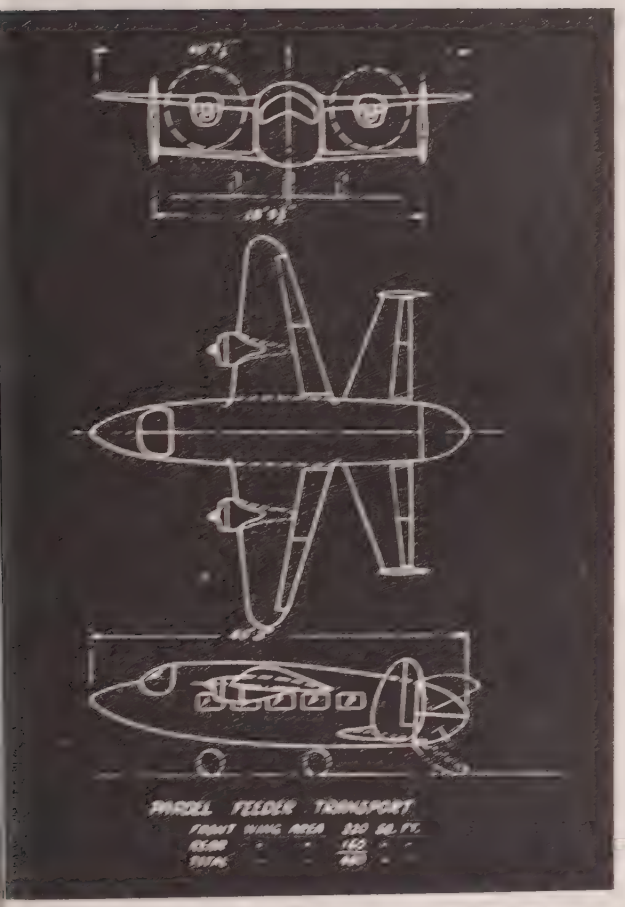
In February a Central Air Defense Force was activated, commanded by Maj. Gen. Cleland Acheson, formerly Vice Commander of EADF at Stewart AFB.

In point of timing, the first requirement for the vast and complicated job of defending the United States from air attack is (*Continued on page 37*)



NAVY link of prime importance in protective radar network for defense of U. S. is the Lockheed PO-1W *(above)*. Next step in defense after one-pass interception attempt will be ground-to-air pilotless craft such as GAPA

DELANNE T-20 is a prototype of the Duo-Mono configuration that has been suggested for feeder airline design



DUO-MONO configuration features a gull wing placed in such a position as to achieve a continuous slot effect. Feeder-liner development (above) of Pardel Corporation follows Duo-Mono configuration for twin-engine plane

PARDEL PLANE

Here's a "new" idea for a feeder-line transport. In a meeting at the University of Oklahoma, feeder-line operators set down their basic requirements for a short-haul airplane. To meet these needs, the Pardel Development Corp., of New York, has offered their concept of a 10-passenger feeder-liner of Duo-Mono configuration. This aerodynamic design has been found to offer extreme resistance to stalls, a 7 to 1 ratio between top and landing speeds, elimination of fuselage drag, and a CG travel of 67 per cent. Prototypes of similar configuration were flight tested in France just prior to World War II. One of the prototypes was a two-place trainer on which over 600 hours flying time were logged. It is described as an "extremely staggered tailless biplane with its wing placed in such a position as to aerodynamically produce a continuous slot effect."

The Duo-Mono configuration, as applied to a 10-passenger airliner powered by two 400-hp Lycoming engines, would have a cruising speed of about 200 mph at 60 per cent power. It would have a landing speed of only 44.6 mph. Its range would be 800 miles.

The Duo-Mono configuration, on which all aerodynamic engineering and wind tunnel tests have been completed, is being offered to aircraft manufacturers under a licensing agreement.

Forgotten Pilots

LOCKHEED production pilots, now flying the F-94's that come off the line, number 13; seven of them are *(left to right)* Dispatcher Denny Cairns, John Fales, Alex Black, author Patton, Ray Meskimen, Ted Brown and Joe Towle

By CARL PATTON

Asst. Chief Prod. Pilot, Lockheed

"WHO'S up next?"

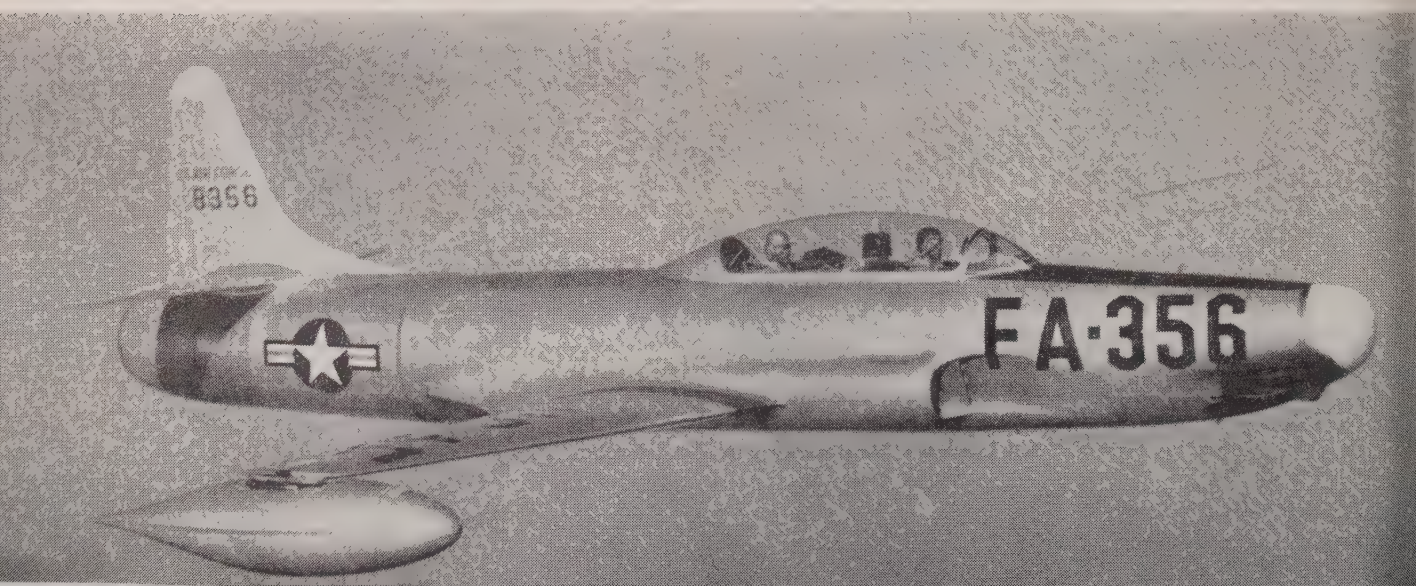
The flight dispatcher walked into the ready-room and our ping-pong game broke up. One of the seven of us was due to go up. Another Lockheed F-94 was ready for its first flight.

Military and engineering test pilots make most of the headlines in modern aircraft. The boys in the back room, the production test pilots, do a more unassuming job when they take the completed models as they roll off the busy assembly line and ready them for the customer.

This job can be as routine as selling shoes. Actually, we do the same thing over and over again every day, and as long as we do it well, there are no newspaper headlines. However, I doubt that any one of the 13 production pilots here at Lockheed thinks that his job is routine. There's something new every day.

Take the time Ray Meskimer had the cockpit of his early model F-80 fill up with smoke. Ray's an old timer with over 14,000 hours in the air in-

PRODUCTION TEST PILOTS flying the F-94 average only 35 to 40 hours a month. Hops in the '94 average hour each



TAKE-OFF is from Van Nuys, then pilot heads for Muroc where 10-mile table-top surface offers "flight insurance"

FIRST PLANES off a production line usually require 12 to 15 flights to work out "bugs" or mal-functions

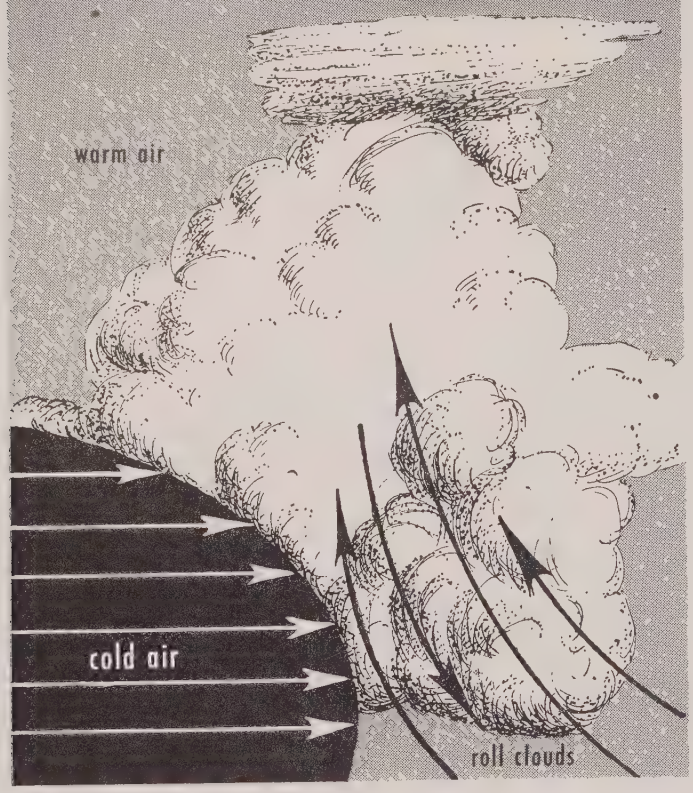
cluding 11 years at the controls of a United Airlines DC-3, but he likes this jet flying better than anything else in the air.

"I couldn't smell the smoke at first," said Ray after he landed, "because of my oxygen mask. I was at 20,000 feet and might have left the airplane if the stuff had billowed any thicker. I could still see out a little so I high-tailed it for home, dumped the dive flaps and made the field on a straight-in approach. When we checked over the airplane later, we found a small hydraulic leak into the compressor line."

Probably our best flight insurance here in Southern California is the 10-mile table-top surface of Muroc Dry Lake surrounding Edwards Air Force testing station. When any of the test pilots around here get into a "bind," we automatically head for "the lake." We try to leave enough fuel aboard so that we can fly the 50 airline miles across the mountains to Muroc in case of any mal-function. But with airplanes that have been as carefully inspected as our current product, there's seldom anything that goes wrong.

If we have the brakes go out or the flaps stick in the "up" position, we usually head for Muroc. An F-94 will take anywhere from two to five miles to stop after a landing (*Continued on page 40*)

TEST PILOT-AUTHOR Carl Patton is shown here climbing into cockpit of F-94 just off Lockheed production line



TURBULENCE is guaranteed in frontal thunderstorm area where cold air displaces a warm moist air mass. Warm air pushes back and overrides cold air causing thunderstorms and severe up-and-down drafts in storm area, roll clouds

Rough-Air Flight

By WILLIS L. NYE

AIR-MASS thunderstorm usually occurs in mid-afternoon. Sun heats an area, causing strong updrafts. This builds to a thunderhead, or cumulonimbus. Turbulence is severe around edges as well as inside towering cumulonimbus, roll clouds

THE trend in the continuing refinement of civilian aircraft is to improve performance, particularly cruising speed. To the prospective plane customer this is desirable because of the looked-for increase in economy of operation and over-all utility. These refinements, however, do impose certain restrictions on the airplane structure as well as the pilot. Also, as it does with most developments that improve plane performance, certain compromises in operation must be expected and observed in the interest of safe-flight operation. While most of the technical aspects of flight in rough air are somewhat complex for the average pilot-owner to understand, some of the more pertinent facts associated with rough-air flight and its effect on the airframe and actual flight operations are presented here.

Gusty or rough-air conditions may be experienced in cross-country flights over various kinds of terrain during the summer months. The natural convection currents in the atmosphere caused by the circulation of air during alternate heating and cooling create air disturbances that can give the unwary pilot quite a jolting, and a mishandled airplane quite a beating.

All certificated aircraft are designed to conform with certain requirements set up by CAA. The manufacturer's compliance with these requirements makes it possible for him to get the Approved Type Certificate required by law. Unless a civil airplane has this certificate, it cannot be put up for public sale or used for carrying passengers.

One of the technical requirements of the ATC is that which covers the anticipated air loads to be imposed on the wing structure, these loads caused by deliberate maneuvers and by flight through gusty air conditions. Where acrobatic maneuvers are concerned, the CAA requirements are high for civilian airplanes, the load factors being based upon the gross weight and airspeed of the airplane. Airplanes specifically intended for flight training are frequently designed to have a higher proportionate load factor and greater strength built into the wing structure so that inept flying on the part of a semi-skilled student will not impose hazardous loads on the airframe. Conversely, airplanes of clean aerodynamic design that cruise in the neighborhood of 200 mph also are required to have a load factor and sufficient strength to withstand the normal air load at rated gross load at maximum speed. The point of cau-

TURBULENCE is more prevalent in hot summer months. The X-C pilot aware of gust-load limitations is a safe pilot

tion is, however, at high airspeeds and in gusty air conditions when the design load factor may be inadvertently reduced through the pilot's lack of knowledge as to the kind of load air gusts impose on an airframe.

Normally, civilian airplanes have the maneuvering load-factor requirements progressively reduced as the gross load and the geometric configuration of the airplane tend to increase. As a result of this design requirement, plane builders do not anticipate that civilian airplanes will be flown in an inept manner or that the major severe air loads encountered in X-C flight will be those imposed by air gusts. The reason why the load factor is reduced as the geometric configuration of the airplane tends

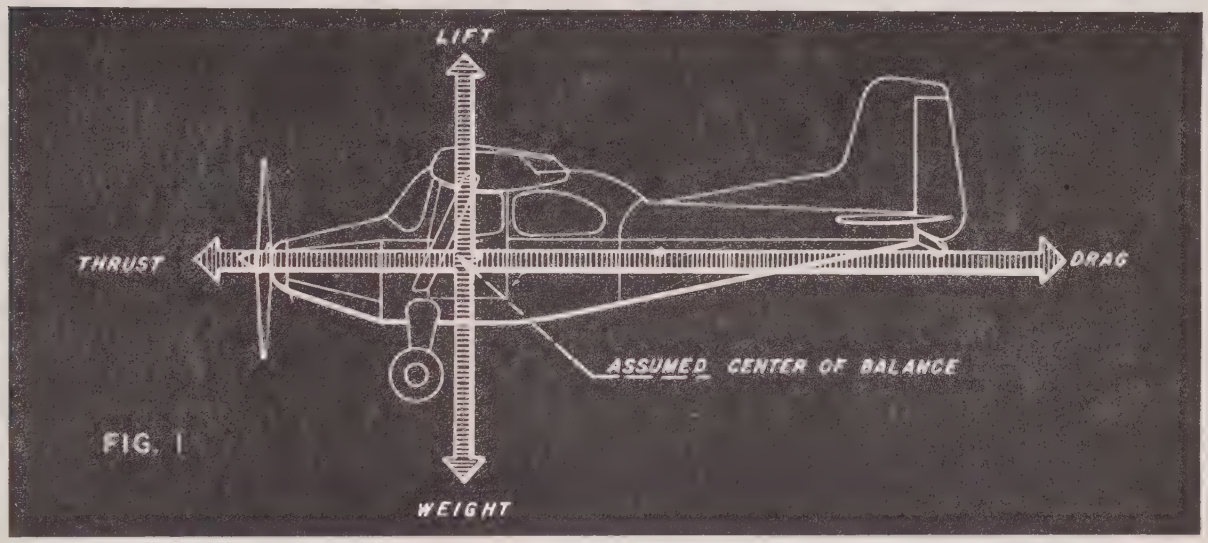


DIAGRAM shows an airplane in level flight with the four basic forces acting in a state of constant equilibrium

to increase is to obtain a reasonable and proportionate payload. For example, if the designed load factor were constant, the weight of the structure would be prohibitive as the size of the airplane increased. Therefore, in the interests of good design performance, a compromise has had to be made on the side of safety, but this "margin" can be and sometimes is reduced to a point of hazard by careless piloting technique.

Air gusts are caused by rising and falling currents as air circulates. For example, if an airplane in straight-and-level flight flies through a rising current of air of a velocity (*Continued on page 42*)

TURBULENT AIR causes "bumps" and severity of the bump is dictated by the level-flight speed of the airplane

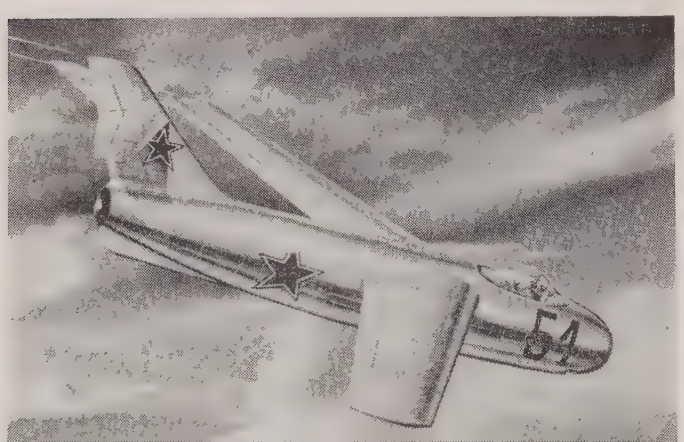
RUSSIAN MIG-15 is shown here in its latest production version. Note the boundary layer fences and dive brakes

Red Star Air Force

The January issue of SKYWAYS contained a comprehensive survey of the latest Soviet combat airplanes. Since the compilation of that material, sufficient information has filtered through the Iron Curtain to enable the preparation of illustrations of some of the jets described but not illustrated and, in the light of latest photo evidence, more detailed drawings of the two swept-wing fighters.

By WILLIAM GREEN

COMMIE FIGHTER is the LA-17 credited with top speed of 630 mph. Note unusual fin under tail part of fuselage



JUST enough has been published concerning Soviet air equipment to keep Western observers frantically interested, despite a tantalizing lack of detail. This interest has, during the past few months, developed into a behind-scenes furor in European military aviation circles. The appearance of the ultramodern swept-wing MIG-15 fighter over North Korea came as a surprise, and it is, perhaps, fortunate for us that we have met this new machine in comparatively small numbers over this area. The Intelligence reports to the effect that many air regiments of MIG-15's are *already* based in Eastern Germany shattered the hopes of the optimists who held the opinion that the few squadrons of MIG-15's

thrown into the Korean battle were just an intentionally misleading "show piece"!

The facts of the matter are that the Soviet Air Force has now almost completely re-equipped with MIG-15's its strong fighter formations based in the Soviet Zone of Germany. Until recently, these squadrons were flying piston-engined LA-9's, LA-11's and YAK 9's. The runways at such airfields as Grossenhein, Finow, Laerz and Brandis are now alive with the new jets and it has been estimated that nearly one thousand MIG-15's are presently grouped around the Berlin air corridor.

Intelligence photos indicate, too, that the German-based MIG-15's are of a later production model than those encountered over Korea. They embody a number of refinements which may indicate an even better performance for the plane than was originally supposed. In the meantime, the MIG-15's operating over Korea—and believed to be based at Autung, just north of the Yalu River—are busily sounding out the capabilities of USAF fighters; the information for transmission to Moscow.

The armament of the (*Continued on page 43*)

JET TRAINER developed by Russians is YAK-15B *(above and below)*. It is a two-seater with speed of 505 mph

TWIN-JET ATTACK BOMBER *(below)* believed to be designated TU-10 has straight wing but a sweptback tail unit. This ship is replacing the old TU-2 of World War II. The TU-10 carries a crew of four, has a top speed of 550 mph

LOS ANGELES INTERNATIONAL AIRPORT, testing station for fog dispersal unit, is fog-bound 5 per cent of the time

FIDO *in the Doghouse?*

By DON DOWNIE

ABOUT three years ago FIDO was turned on at the Los Angeles International Airport for the first time. FIDO is the flame-throwing Fog Intensive Dispersal Of unit that literally burns fog off runways.

Through a long series of misadventures, FIDO's premiere was probably the aviation flop of the year.

Many overenthusiastic agencies climbed on the FIDO band wagon as a fire-breathing cure-all for dirty-weather flying. Without even the precaution of a trial run, a plane load of aviation big names and newspaper reporters was sent up to witness the first FIDO landing in Los Angeles. Previously the system had been working successfully at the Landing Aids Experimental Station at Arcadia, California, probably the foggiest field in the country.

On this ill-fated foggy night of May 24, 1948, a Western Airlines DC-4 was loaded with dignitaries to witness the experiment. The pilot was Jack L. Thayer, chief of Western's flight crews. After FIDO had burned for nearly 20 minutes to clear the runways, the DC-4 taxied out for take-off. The original ceiling was zero and visibility was $\frac{1}{32}$nd of a mile, but FIDO lifted it to a half mile and 200 feet—the legal minimum for take-off.

ONE-BURNER test stand for FIDO is demonstrated by FIDO head Jack Egan

FIDO BURNERS are 12 to 14 inches above ground. They heat up to 500°

After breaking out on top at 300 feet, the DC-4 turned in for a standard ILS instrument approach. FIDO was turned on again and the blazing flames dissipated the fog very well over the burner lines. Observers on the ground could see blue sky above, but the burners were 400 feet from the center line of the runway, and the fog billowed down the center of the flight strip from open taxiway and high intersections. After two unsuccessful low approaches, the DC-4 finally sneaked into an ignominious landing and breakfast at Burbank, the former main airline terminal across town. The visiting dignitaries came home by bus and FIDO took a terrific panning.

A standard witticism heard often at the airport went: "Did you hear that they were going to build a fence all the way around the airport?"

"No, why?"

"To keep the dogs off the field when FIDO's in heat!"

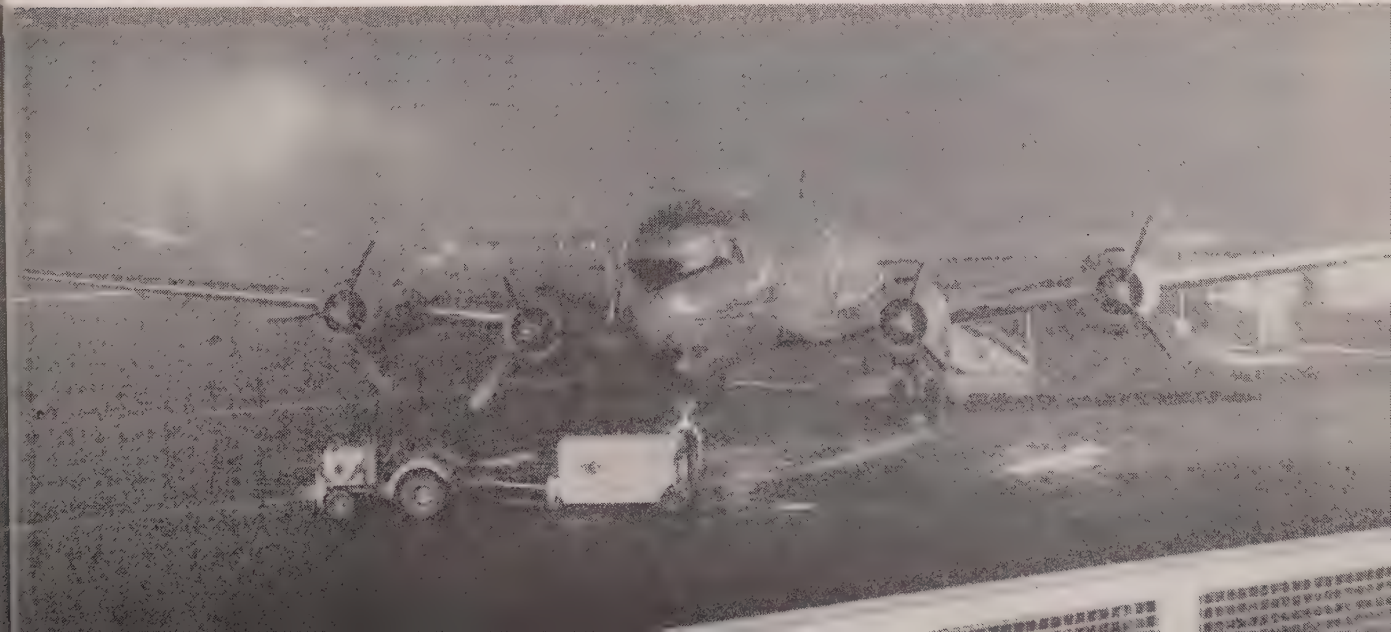
Then someone dreamed up the idea that FIDO meant "Funny, It Doesn't Operate."

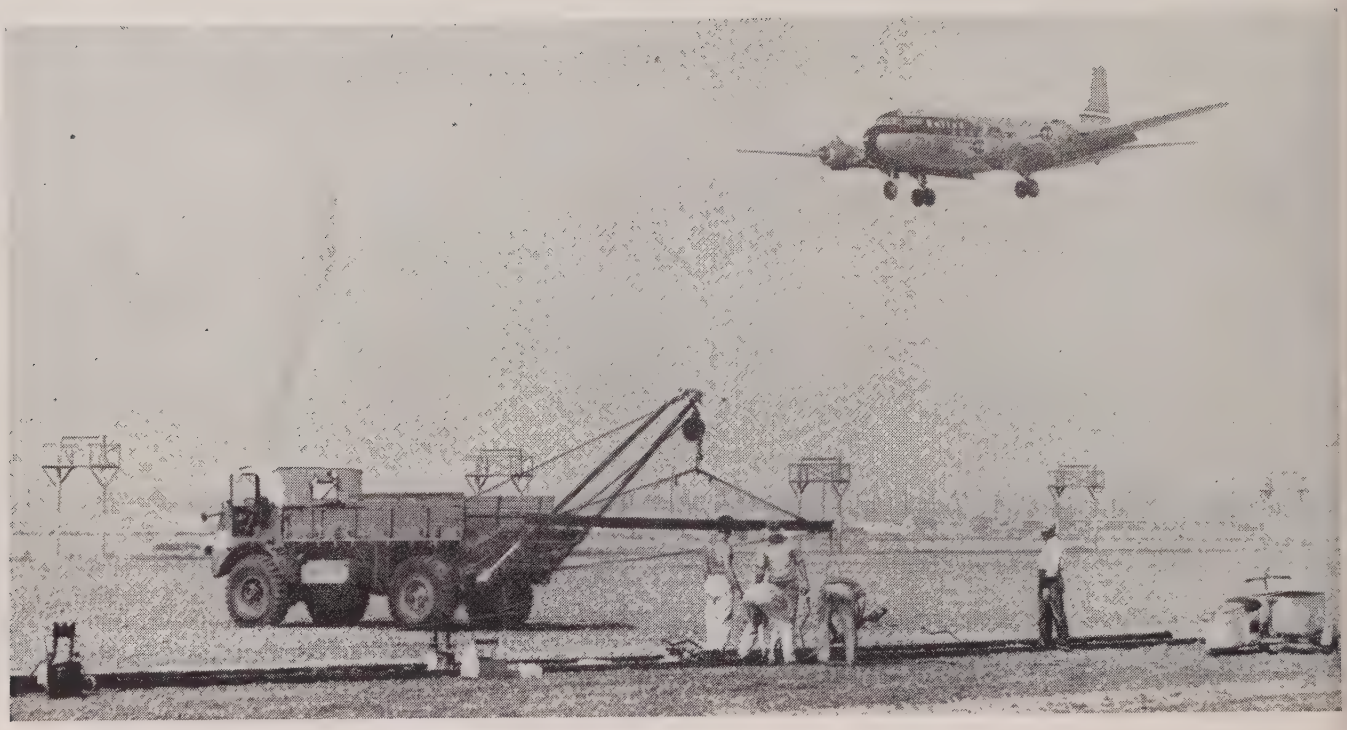
FIDO was really in the dog house.

Now almost three years after this little preview, FIDO is nearing re-completion. To the original $842,000 installation, an additional $300,000 has been spent to place 15,000 new pipe 200 feet from the center line of the main instrument runway at the International Airport. (*Continued on page 22*)

BURNER LINES at L.A. are being placed 200 feet from center of the runway. System burns a light "smokeless" oil

WEATHER at L.A. International can be bad: during one month in 1949, field was closed for more than 151 hours





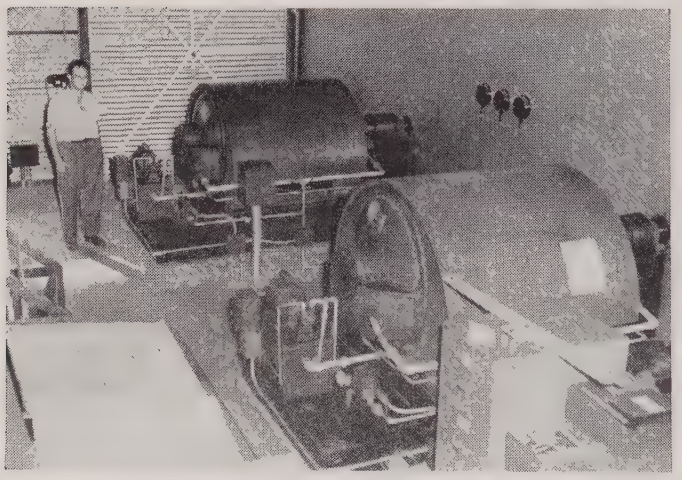
FIDO is not the only low-visibility landing aid at L.A. International. Note in this photo *(background)* high-intensity lights

The gaps in the burner lines have been plugged by spur lines that parallel taxiways and highways, and 295 new burners have been installed.

Completion of this project was expected in May or June, depending upon Government allocation of essential material for transformers, valves, wire and triads (three nozzled burners).

The basic theory of FIDO is simple and well proved. Raise the temperature of moisture-laden air and some of the moisture is absorbed. The system is basically the same as a bathroom heater: without heat everything in the room fogs up, but turn on the heater and there's no fog.

From extensive experiments with the type of fog normally found in the Los Angeles area, it has been determined that a 3° temperature rise is sufficient to dissipate fog. This is based on the size of the droplets, time of evaporation, temperature, and inversion characteristics of the air.



PUMPS feed oil to the 392 triads (burners) that were originally designed to burn 1,750 gallons of oil per minute

FIDO has an excellent past record. The system was first used by the British in 1943. Early in 1942, then Prime Minister Winston Churchill said, "It is of great importance to find means to disperse fog at aerodromes so that aircraft can land safely. Let full experiments to this end be put in hand by the Petrolium Warfare Department with all expedition. They should be given every support."

The first FIDO unit was installed at the RAF Bomber Base at Gravley, Hunts. This installation was completed and tested briefly in January, 1943, and then five months elapsed before the weather again became foggy. This unit raised the visibility from 100 or 200 yards to 1300 yards and one day brought in 85 bombers during an eight-hour period, half of them from other bases that were socked in to the point where landings were impossible.

In all, a total of 12 FIDO installations were built at British airfields. Statistics show that 2,486 aircraft and some 15,000 airmen were rescued by FIDO in England alone.

In 1944, the U. S. Navy installed a somewhat similar system at Amchitka in the Aleutian Islands. These Alaskan installations were highly successful even in 30-mph winds, but these early systems all had the disadvantage of taking from 10 to 15 minutes to build up to maximum heat. In addition, they were wasteful of fuel. (*Continued on page 44*)

MOBILE SOUND UNIT for amplifier system rests on rear seat; microphone hangs on hook over windshield, within easy reach of Pilot. Frisco

Sky Spieler

By EDWIN W. HOBART

"THE strike has been settled. All glass workers report to work Monday morning. All glass company employees are to report to work tomorrow morning—the union and the company have reached an agreement."

These welcome words startled a sleepy New Jersey population one Sunday morning. The voice seemed to be coming from the heavens. And indeed it was! It was Joe Frisco in his amplifier-equipped plane. Announcements by Frisco Aerial Advertising had become quite common but not at this time of day—certainly not on Sunday! No strike-idle glass workers or their families complained about the disturbance that morning, however!

Actually, "Joe Frisco" is Joseph Farinaccio, of Vineland, New Jersey. The main reason for the advertising is Joe's enthusiasm for flying. In his own words, "I'd rather fly than eat—and I frequently have."

Joe's flying career dates back to 1940 when a pilot-buddy asked Joe to drive him to the airport. Upon arrival, his friend invited him to go up.

"Not me! I'll wait here for you!" was his reply.

His pilot friend circled the field and then glided to a landing near where Joe was waiting. "Come on, Joe. You'll enjoy it."

Joe went up and he did enjoy it. When they landed, he asked if they couldn't take the afternoon to go flying. His friend instantly agreed—if Joe would pay for the flight time. Joe would! They skimmed past Atlantic City, circled Cape May, hovered over Philadelphia and landed back home again three hours later.

That morning, Joe hadn't wanted anything to do with an airplane. That evening, he took his first half-hour lesson. For the next eight days he had a half-hour lesson every morning and every afternoon.

When World War II engulfed us, Joe took a two-month course at Danville, Pennsylvania, that graduated him with a commercial license and an instructor's rating. The next two years he gave basic training to Army students at the University of Tennessee. Many had never been close to an airplane before their basic training began.

The young students were often blinded by the glamor of the Caterpillar Club and were anxious to take advantage of any opportunity to bail out of a disabled plane. While a student was putting the trainer through some spins one day, the motor quit. Frisco had to grab the trainee by the belt

(*Continued on page 45*)

SKY SPIELER Joe Frisco is Joseph Farinaccio, of Vineland, New Jersey. Note loudspeaker mounted on plane's wing strut

Wild Guy in an OY

WILD GUY—Capt. McCaleb *(left and above right)* shows Capt. Parker where he carried 10 wounded men in a TBM

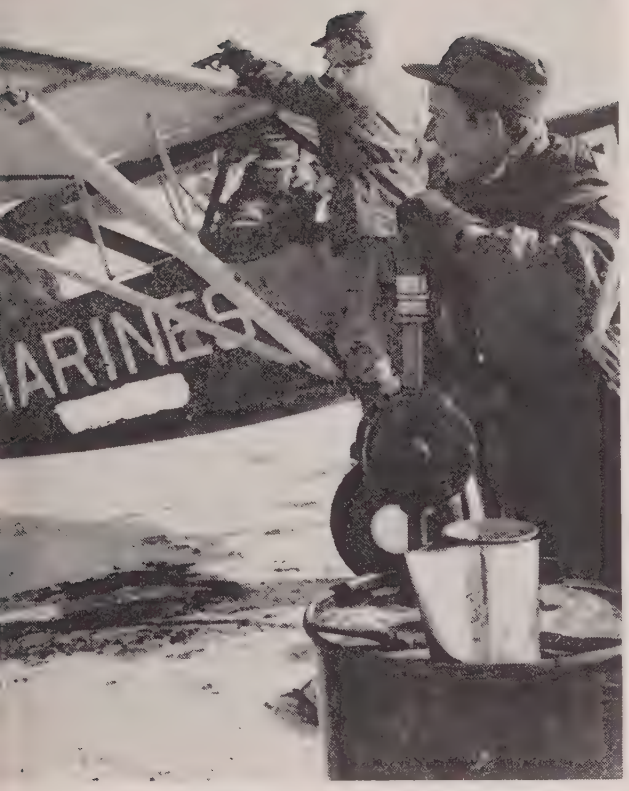
By Capt. HUBARD KUOKKA, USMC

ONE would think Marine Capt. Alfred F. McCaleb, Jr. of New Orleans has been trying to win the Korean War by himself in a light, fabric-covered observation plane.

In fact he has been flying like a one-man squadron. This is not to detract, however, from the missions of the other courageous OY and helicopter pilots of Marine Observation Squadron Six, to which he is attached. Their exploits are known.

While directing air support to the besieged Marines in the mountains north of Hungnam, McCaleb loved nothing better than to dive his light OY

BRIEFING—Maj. Gottschalk *(kneeling)* points out to OY pilots Korean sector where they can expect enemy fire



maneuvers are strictly a serious business to him.

"Of course I've got to fly low enough to see if they're Marines or enemies," he explained. "Many of those no-good Commies wear Marine clothes. Only way I can recognize them is to see their faces. If I yell at them, and they are Marines, they will yell back, 'Oh, go bury yourself, you Ape' or somethin' like that. Commies just look stupid and reach for their guns. That's when I drop the smoke grenades to mark the spot for the fighter boys."

Once a convoy was pinned down between Hagaruri and Koto-ri, and it looked like the Marines, who were outnumbered tremendously, had had it. McCaleb, conscientious as he is, felt it was his responsibility to wipe out the clusters of enemy on the reverse slopes of the hills before dark when the Reds would try to move in for the kill. His observer

GAS UP—Sgts John Danko and Wyatt Van Laningham *(left)* gas up a Marine OY for another flight over North Korea front. Crewmen *(below)* are the boys who keep Marine helicopters and observation planes flying in Korea

"Grasshopper" observation plane "out of the sun" onto the heads of the startled Chinese Commies. He'd make with the Rebel yell, drop a hot smoke grenade amongst them, and dodge away.

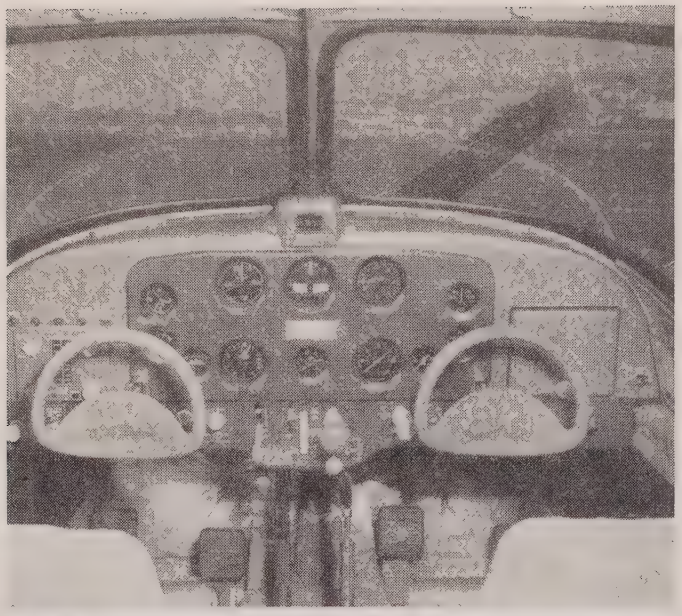
Then his fighter buddies in the *Corsairs* above would clobber the Reds with napalm, rockets, and fragmentation bombs.

The VMO-6 observers riding in the back seat of McCaleb's plane, have come to expect one cheap thrill after another. They claim he is strictly a fighting man from the words "man your planes" and would just as soon fly low enough to punch a Commie in the nose.

However, the soft-voiced Southerner claims his was Lieutenant Hugh L. Akin of Tulsa, Oklahoma.

"It was gettin' right late in the day, and only Akin and I knew where the Reds were," he explained. "It was our job to mark them for the *Corsair* pilots so they would wipe them out."

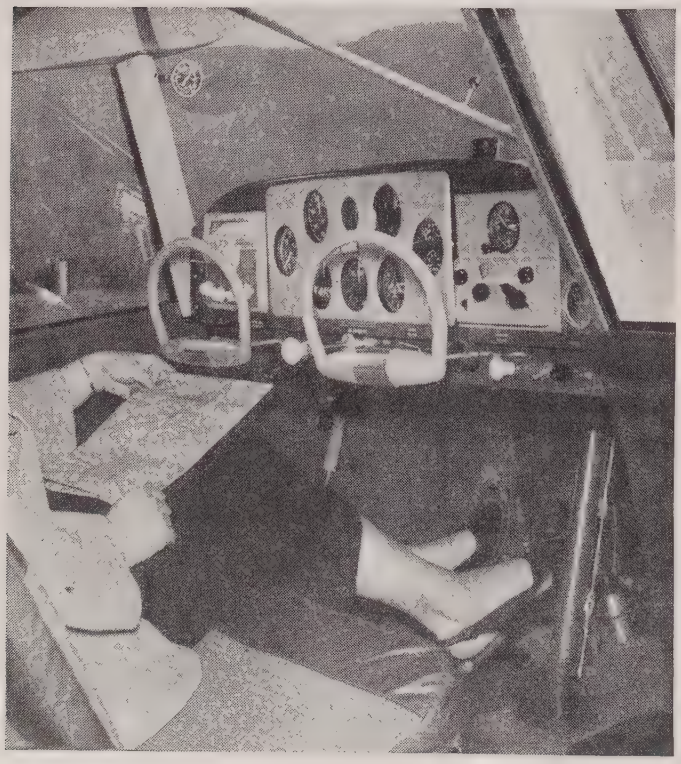
The pair led in seven strikes of Marine carrier-based and land-based fighters. By dusk the Communist ranks were beaten up enough to enable the convoy to advance a bit. But during the night the Communists attacked again. The next day the convoy was still pinned down, fighting. McCaleb swooped down again and again on the defiant Reds and talked in more *Corsair* strikes. The outnumbered convoy inched *(Continued on page 46)*



STANDARD PANEL on a Ryan *Navion* includes turn-and-bank, rate-of-climb, etc. Instrument panel costs extra $446.60

Panel for Your Plane

By GIL C. CLOSE



PIPER PACER (Custom model) features complete instrument panel. Radio is Bendix VHF and LF. Orienter is on right

THE usual mid-week quiet hung over the local airport. A single lightplane drew slow counter-clockwise circles in the afternoon sky, piling up hours on its engine and solo time for its tyro pilot. The low roar of a blowtorch, interrupted occasionally by a light hammer blow, issued from the wide-open doors of the repair hangar. Old Hank "Joystick" Benson, sprawled in a folding deck chair on the grass plot in front of the field office door, watched my approach.

"Taking it easy as usual," I greeted.

Hank rubbed gnarled fingers through the scraggly beard on his chin. "No," he denied. "I'm thinking. When you've spent as many years as I have, flying by the seat of your pants, you'll find you have to have a certain amount of weight on your fanny in order to think clearly."

"What's on your mind today?" I asked, easing down into another chair so my own brain would start to function.

"Instruments," Hank answered. "Flight instruments . . . something we never worried about in the old days."

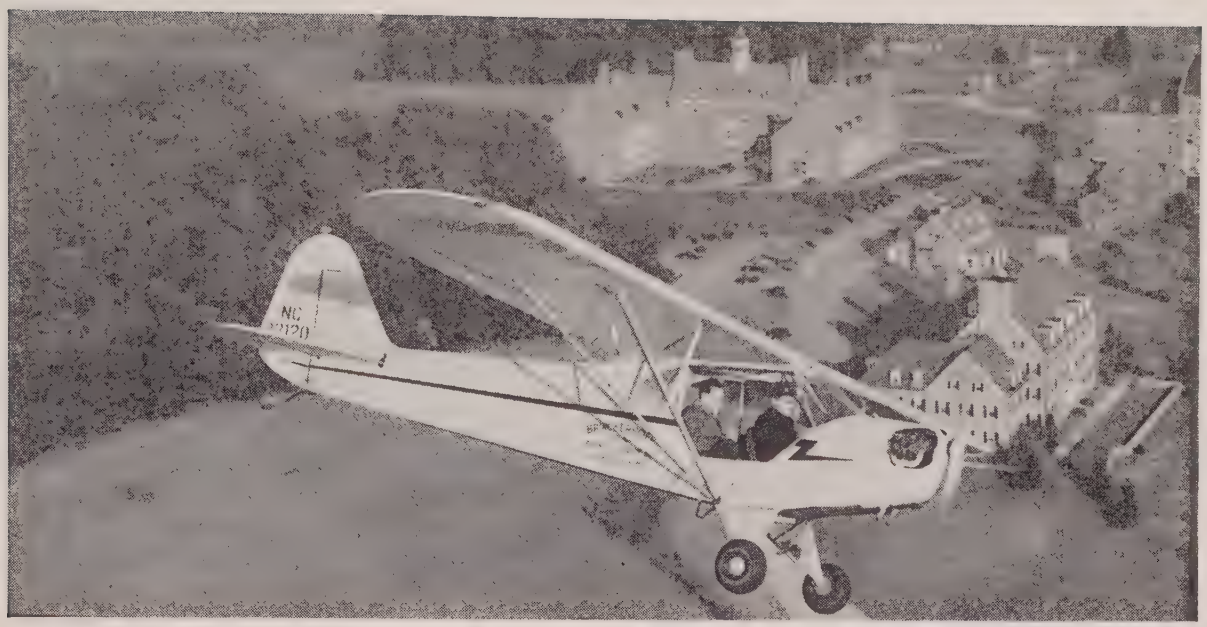
The oldster eased downward a bit in his chair, placing even more weight on his posterior portions.

"Johnny Newcombe needs another plane in his aerial photography business. Says he's beginning to pick up some out-of-town orders, and will have to do more cross-country flying. He's asked me to recommend the flight instruments he'll need. Now I know Johnny ain't rich, so . . ."

Hank paused and rubbed his chin again. I knew the problem he was up against. Proper flight instrumentation for lightplanes has been a conundrum that has been kicked around for years. For every pro there seems to be a con, and vice versa.

Some hold that a lightplane should be instrumented in proportion to its cost. This is like claiming that a dollar watch should not have a minute hand. More specifically, why should a $3,000 lightplane, if you need it, be forced to remain on the ground, while a $10,000 job is instrumented so it can fly in all but the worst type of weather?

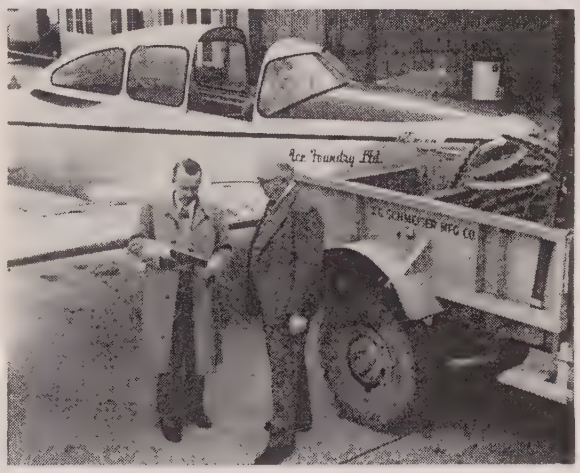
Increased emphasis on the utility rather than pleasure possibilities of lightplane ownership only adds to the complexity of the instrumentation problem. When an airplane is purchased for utility purposes, each day that it must remain on the ground detracts from its utility value. Its total utility value is represented by the number of days in each year that it can be used. The salesman who depends on getting from town-to-town in line with



TRAINING PLANES such as this Piper *Cub* need few instruments other than compass, altimeter, airspeed indicator

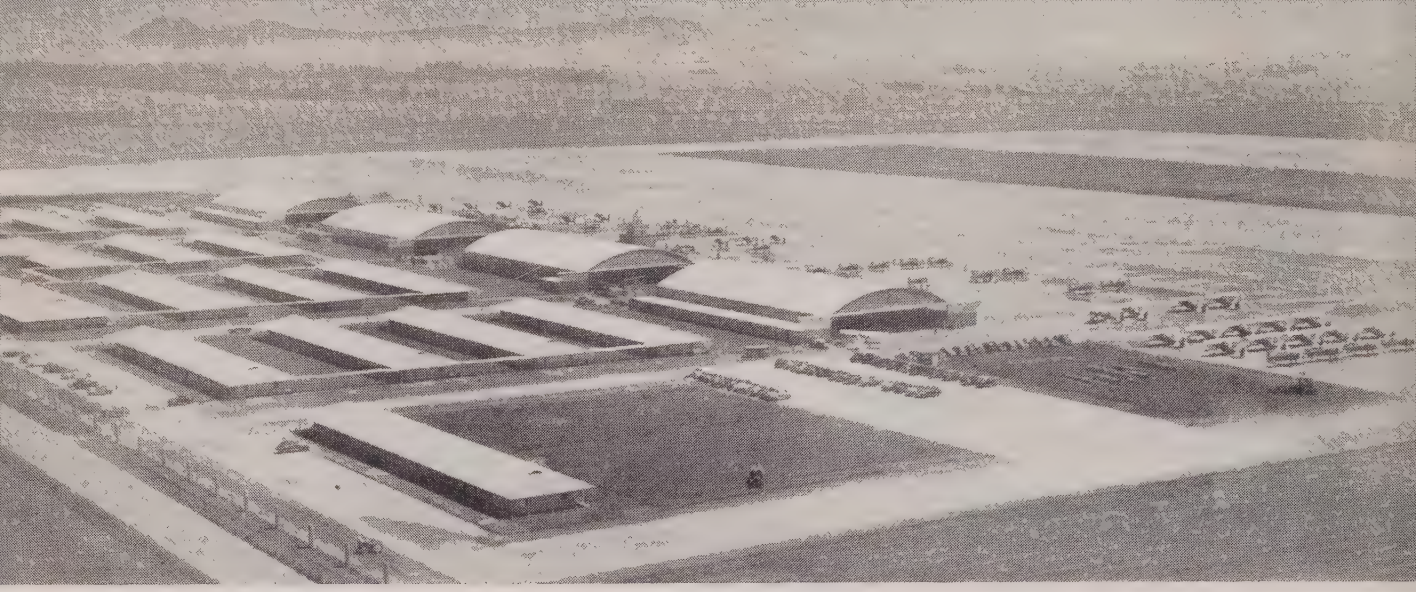
a rigid traveling schedule or to keep appointments, the rancher who must search for lost stock or inspect a line fence, or the oil man who must patrol miles of pipeline for possible leaks, cannot wait upon slightly inclement weather to pursue his respective tasks. Nor is it logical, merely in the interests of aviation, to ask them to assume the expense of alternate methods of doing the work.

A recent survey by Kollsman among members of a rather large pilots' organizations revealed many interesting facts concerning lightplane instrumentation. An analysis of more than 3,000 responses indicated that improper (*Continued on page 50*)



BUSINESS AIRCRAFT need instruments to ensure utility. *Navion* (above) has directional gyro, sensitive altimeter, etc.

WEATHER closing in, this pilot can make his destination because he has instruments, knows how to use them



FLIGHT SCHOOLS such as Cal-Aero *(above)*, Embry-Riddle, Dallas Aviation, etc. trained airmen during war

Contract Flight Training

By ROBERT C. FRANKLIN

With the Air Force scheduled to expand to a total of 70 groups by next summer, and between 95 and 100 groups by the summer of 1952, civilian aviation flight and ground schools are rapidly being brought into the training picture. This is a distinct advance from the Air Force position of a year ago, when the Stanford Report was being studied by Air Force officials. The Stanford University study was made for the Air Force to determine the desirability of civilian schools conducting basic flight training of Air Force cadets, the first 130 hours of a total training period of around 300 hours.

The first step was the decision to test the validity of the data and assumptions made in the Stanford Report by going into contract flight training on a test program with one contractor, setting up as nearly as practicable the same conditions prevailing in the USAF's own basic flight-training installations. There are six USAF basic flight-training centers now in operation with more due to be opened before the end of fiscal 1951 (June).

AIR FORCE expansion to 95 and 100 groups by 1952 brings civilian flight schools back into air force training picture

CADETS of Royal Pakistan Air Force trained in F-51 *Mustangs* at Hawthorne Flying Service School in Jacksonville, Fla.

This will mean a complement of 125 preflight cadets and 450 flight cadets for each school. To literally duplicate the conditions found in these USAF schools, the civilian school will have to maintain the equivalent of a military organization including messing, housing, guards and a transportation pool.

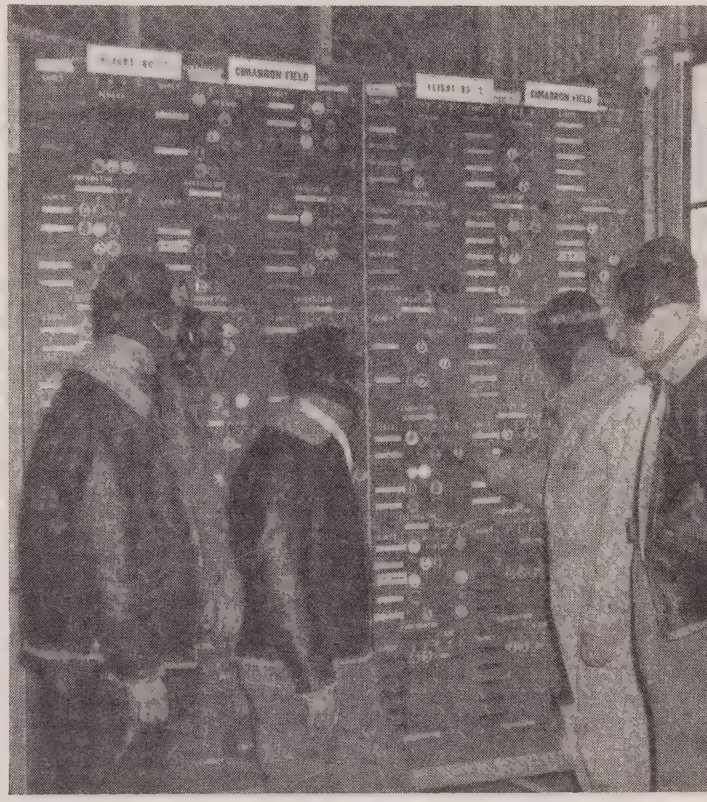
The Air Force believes this program will result in the saving of a considerable sum of money. The Air Force these days, of course, feels that it is absolutely necessary to stretch each dollar just as far as possible.

Apart from the military personnel factor, however, it is expected that conditions in the civilian schools will be nearly equivalent to those existing in the Air Force establishments.

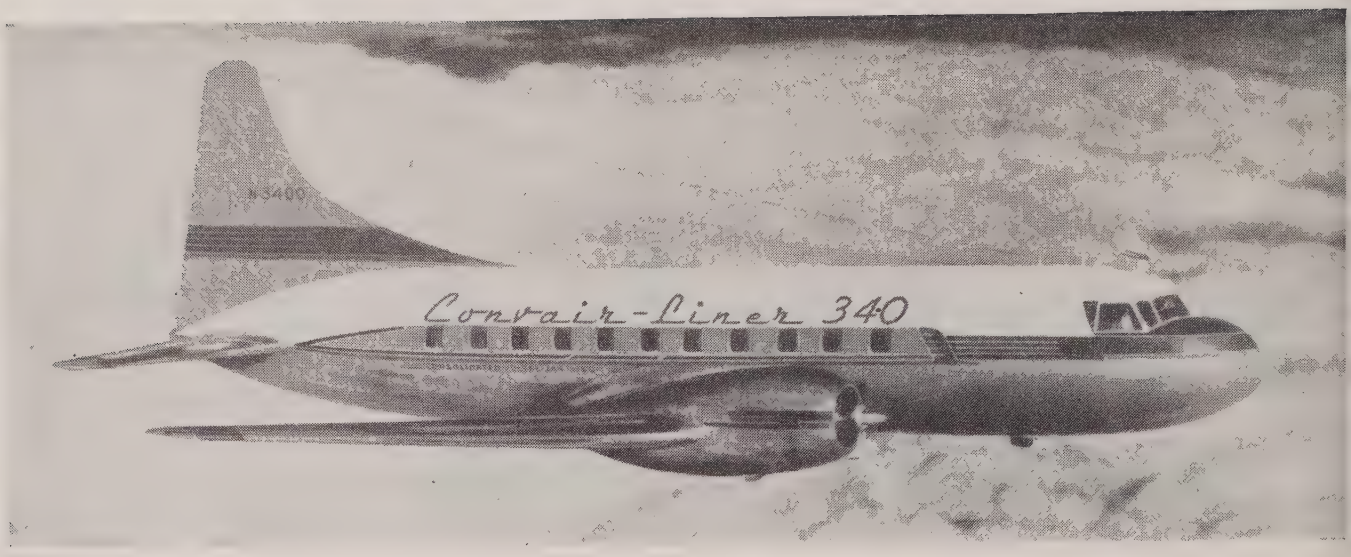
It was finally decided to award contracts to two civilian flight schools, one to use the Greenville AFB and the other the Columbus AFB, both in Mississippi. Bids were received from well over 61 operators for the Greenville contract and 39 for Columbus. Greenville was awarded to Graham Aviation of Butler, Pennsylvania. California Eastern Airways, Inc. of Oakland, California won the award for the Columbus base.

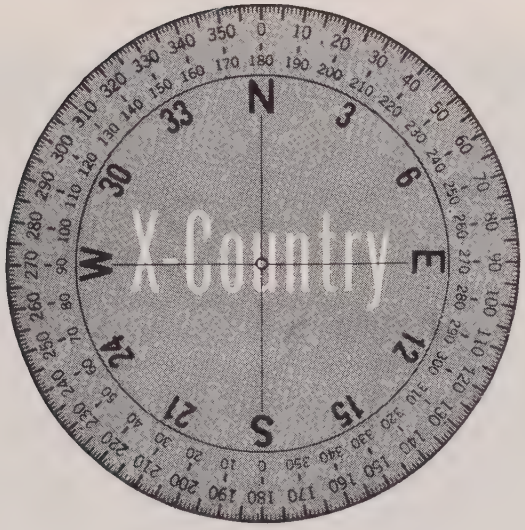
At a February meeting in Dayton, Ohio, it was disclosed that bids for two more contracts for civilian basic flight schools were to be opened up during March. Some 260 representatives of aviation schools and communities interested in the projects went to Wright-Patterson AFB to hear some of the details and to learn more about the Air Force training program in general.

The basic flight schools carry the cadets through their first 130 hours, after which they proceed to advanced fighter-trainers such as the F-51, T-33 jet and multi-engine trainers, including the B-25, etc. Officers maintain that most of the unsuitable pilot material is eliminated during the first 30 hours of training on PT-17's, etc. (*Continued on page 54*)



CIVILIAN FLIGHT schools during World War II trained from 12,000 to 30,000 pilots per year. Peak year saw 100,000 airmen graduate. Present emergency need for trained pilots could be met by these and other civilian air schools

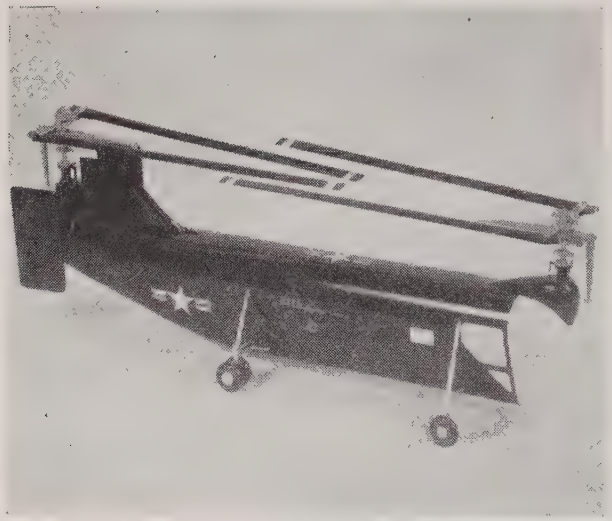


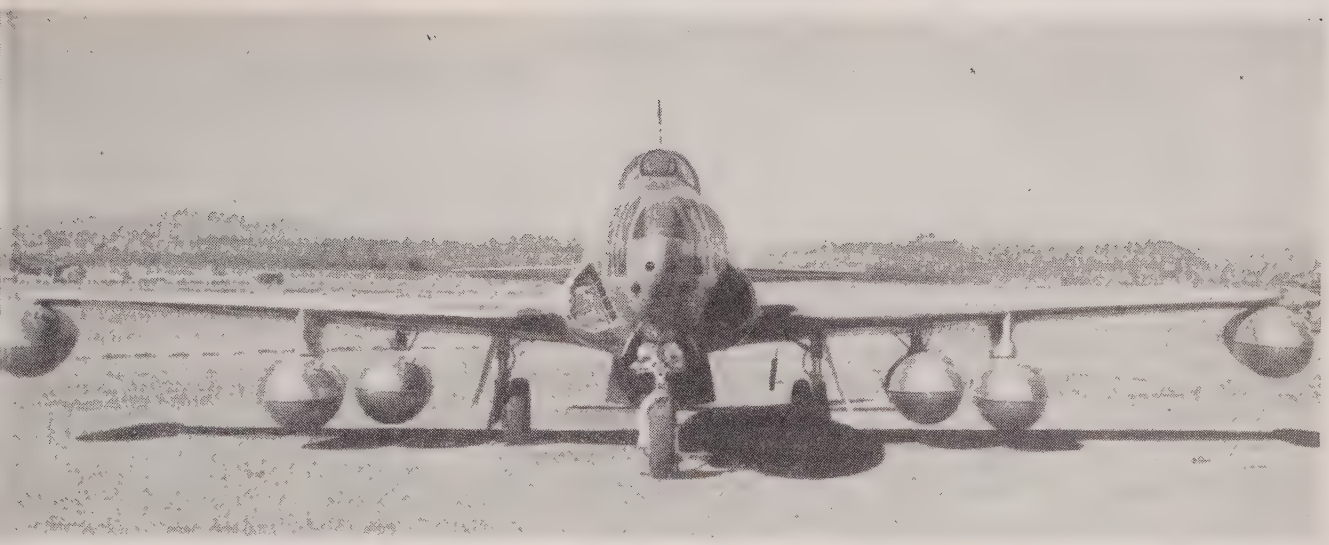


CONVAIR-LINER 340 is Consolidated Vultee's new 44-passenger medium-range air transport. Design of the 340 is based on the Convair-Liner 240 currently in use by 15 airlines. The 340 has more wing area, longer fuselage, more powerful engines and a higher gross weight than the 240. It will also cruise at higher speeds than the 240. Although it will be powered initially by two 2400-hp Pratt & Whitney engines, it was specifically designed to use powerful turboprop engines when these become available.

DOUGLAS SUPER DC-3 is shown here rising swiftly on a column of smoke and the thrust of JATO (jet-assist take-off) bottles. This version is the special military model of the Super DC-3, to which JATO has added the advantage of extremely short take-off distances. Like the commercial versions of the Super DC-3, the military model is powered by two Wright R-1820 engines. New outer wing panels give the Super DC-3 greater speed, more payload and longer range than the original DC-3 type.

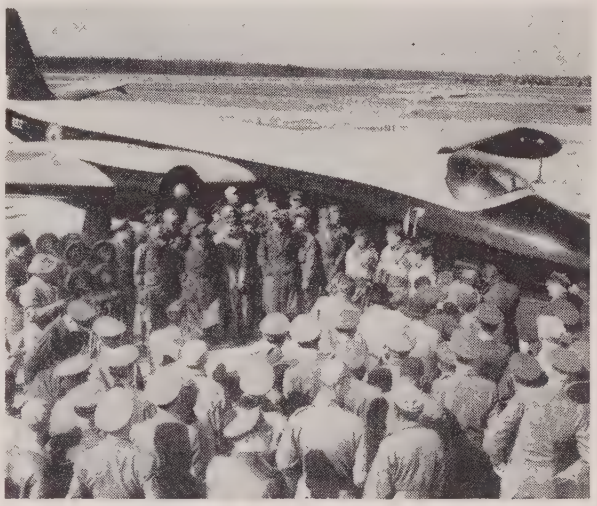
NAVY XHSL-1 is the first helicopter specifically designed for anti-submarine warfare. The tandem-rotored Bell XHSL-1 is powered by a Pratt & Whitney engine in a buried installation. The fore and aft rotors are inter-connected and can be folded for elevator transportability aboard a carrier. The new Navy 'copter employs a quadricycle landing gear.





FLYING FLAME-THROWER is this Lockheed F-80 jet fighter. Dropping napalm "fire bombs" on the enemy in Korea is just one of the ground-support jobs this front-line jet fighter is doing. This photo shows the F-80 carrying six 110-gallon tanks filled with jellied gasoline. The tanks are dropped from low level in front of the target. In the first seven months of the war, the F-80's dropped 1,662 tons of bombs, fired 49,873 rockets, 19,810,852 rounds of ammunition against ground targets.

BRITISH CANBERRA and her crew get a royal welcome at Drews AFB, Maryland. The twin-jet medium bomber was enroute to Dayton, Ohio, after an unofficial record-breaking flight from Ireland to Newfoundland. The *Canberra* made the Atlantic crossing in four hours and 37 minutes. Actual performance figures for the *Canberra* are a closely guarded secret, but the jet bomber is known to have a speed rating well in excess of 600 mph. In photo here GI's swarm about the RAF *Canberra* and her crew.



USAF INTERCONTINENTAL BOMBER, the Consolidated Vultee B-36 is shown here on final assembly at the Fort Worth Division. The B-36D, now in production, is powered by six 3500-hp piston engines, plus four jet engines, each developing approximately 5200 pounds of static thrust. Note that after the outer wing panels have been installed, the B-36 must be turned sideways so that the 230-foot wingspan will fit in the 200-ft wide assembly bay. The B-36 is the only heavy bomber presently in production for the Air Force. Another version, heavy reconnaissance bomber, is designated RB-36. Consolidated may take over facilities in New Orleans for B-36 building.

FORMATION FLYING is safe and sane *if* you are a precision pilot and understand team work. It's not a beginner pilot's sport. Another sign of safety in a pilot is a good pre-flight check. Make sure the gas cap *(below)* is on right

PRE-FLIGHT check calls for a look at your plane's oil supply as well as its gasoline

For Safety Sake

By BEN ROBIN

It was Sunday afternoon and the airport was crowded with local planes and visitors. Suddenly, a girl screamed! Her outcry turned all eyes toward a lightplane that careened crazily about the apron and parking area. A man was running and the plane, which was pilotless, seemed to be chasing him. When the man turned right and then left, the plane, as if controlled by radar, seemed to gain on him. Finally, the man headed for the hangar and ducked inside the open door. The plane turned and hit the side of the hangar with a sickening shatter of wood, fabric and glass. Fortunately, there was no loss of life but only several hundred dollars worth of property damage. That man was lucky.

This accident, or a similar one, could and probably has happened on your airport. Cranking a plane without first chocking the wheels or having a pilot on the brakes is only one of the many causes of plane accidents. Here are some of the others which cause plane owners, pilots, commercial oper-

TAXIING calls for care and caution. Remember your wing pokes out a good 15 feet, so keep plenty of clearance between you and another plane or such airport vehicles as gas trucks, parked aircraft, etc. Watch field traffic

ators and CAA inspectors daily headaches. And here's what to do about preventing them.

Accident prevention should begin in the hangar, where all flights start. Unless you have stayed with your plane day and night since last parking it, you must look the plane over for bumps and bangs. If your plane is parked in a large hangar, other owners may have been careless about storing their craft near yours. Look over the wing tips, ailerons and rudder; then if you do find any new bangs and dents you can decide whether or not they are serious enough to delay your take-off. Minor damage can be repaired later.

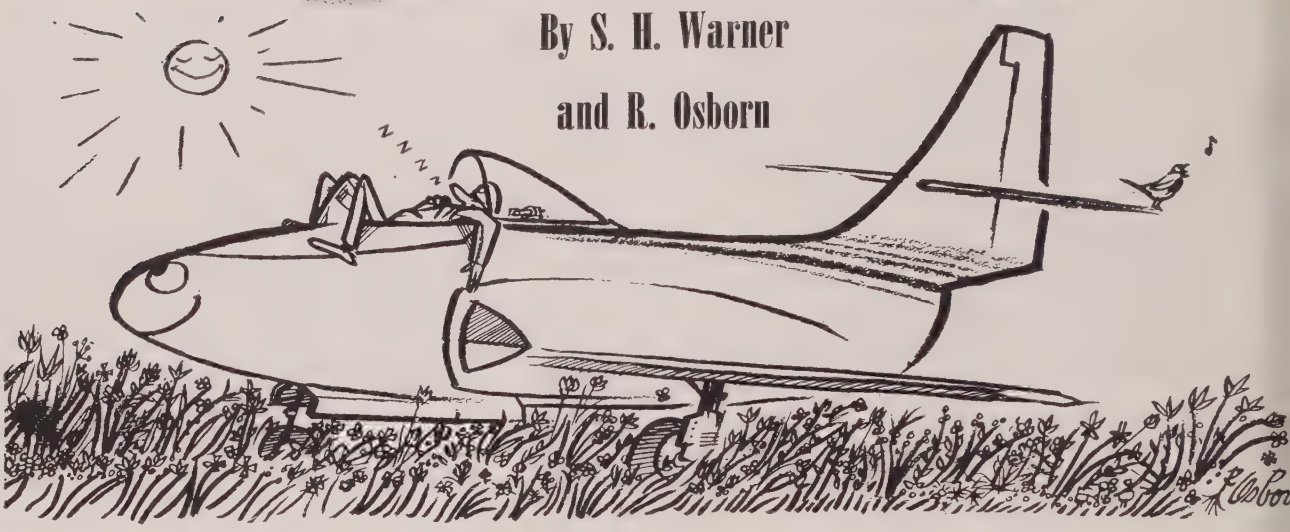
Before leaving the hangar, you should look at the gas and oil tanks and sediment bowl. In order to prevent condensation which causes water in both gas and oil, you should fill tanks at the *end* of a flight instead of before the next one. If there is dirt or water in the sediment bowl, drain it, replace the gasket at the top of the bowl with a new one and make certain that there is no seepage at the top of the bowl when it is replaced.

Now that your plane has been visually checked, you can push it out of the hangar and onto the apron or starting ramp. I have already told you the story about the man who forgot to check his plane before starting the engine. I need only add that you must be careful (*Continued on page 48*)

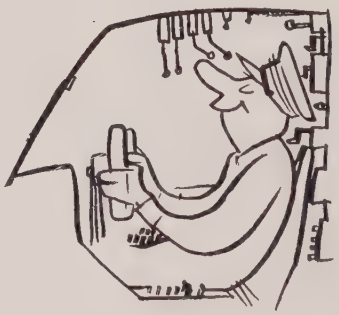
TRAFFIC at a busy field calls for constant care in operation. These planes actually are landing too close together. The faster plane *(rear)* could easily overtake the front slower plane if pilot failed to show caution

DILBERT

By S. H. Warner
and R. Osborn



Don't Lose Your Head—The other day, Dilbert, blithe spirit, was tumbling around in the wild blue yonder. Wasn't doing too badly, either, until, coming out of an inverted spin, he found his prop had shifted to positive low pitch.



Now this wasn't a very serious emergency, but Dilbert managed to turn it into one. When he found he couldn't change his propeller setting, he got rattled and decided to land immediately in a nearby emergency field. Although he easily could have made his home field, the decision to land immediately wasn't particularly blameworthy. But the execution was stinko!

In his excitement, Dilbert forgot to lower his wheels. No tower personnel were there to warn him, so he carried it through to the end. Grinding to a halt, he stepped clear—just ahead of the flames!

How to Avoid Thunderheads—Shortly after take-off, the airliner entered an altostratus overcast at 7,000 feet. After half an hour on instruments, the captain of the airliner turned to his co-pilot and said enthusiastically, "This is great stuff to fly in. It's always smooth and gives you a good chance to brush up on your instrument procedure."

These were almost "famous last words," for a few moments later they ran into a cumulonimbus cloud (thunderhead). Terrific turbulence was encountered, and passengers were tossed about. Fortunately, however, it was soon over and there were no serious injuries or material damages.

The flight engineer noted later, from an accelerometer which had been installed for a previous test flight, that 5 g's had been registered from upward motion and 3 g's from (*Continued on page 60*)

The skipper goes frantic at the new pilots' antics

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

Executive Airport

The highly industrialized city of Racine, Wisconsin, recently was in danger of losing its airport, which had been serving a number of company-operated aircraft in the area. This was the Horlick-Racine Airport, built some years ago by Mr. Horlick and two friends who shared his vision. After his death it was offered to the city as a municipal airport, but local politics prevented the deal from going through, and the Horlick heirs were preparing to sell the field to a realty company for private real estate development.

A group of Racine companies which operate executive aircraft, including the J. I. Case Co., Young Radiator Co., Walker Manufacturing Co., Twin Disc Clutch Co., Jacobson Co., and several others, formed the Racine Airport Corporation last fall. Cole H. Morrow, J. I. Case chief plant engineer, was the prime mover in the project and was elected president. The group sold $250,000 worth of stock, purchased the field, put it in shape and began operations in February. No Federal funds have been used or applied for.

Eleven companies, operating 14 aircraft, are now in the group. Models include Twin Beeches, Beechcraft *Bonanzas* and Cessna 190's. Runway potential is 4,000 feet, with some 2700 feet paved at present. A unique hangar of "umbrella-type" construction, designed by engineers in the group, was built, using a minimum amount of steel, and is serving the purpose quite adequately.

Planes, Parts & Pilots

For some months CAOA has been active in the effort to establish the essentiality of company-owned and operated aircraft in the national mobilization picture.

More recently the question of priorities for parts, components and equipment to keep these planes flying has come to a head, and the Corporation Aircraft Owners Association has been cooperating with CAA's Office of Aviation Defense Requirement, the NSRB industry-government task group on Maintenance and Overhaul, etc., to establish a workable long-term program to get parts with the least possible amount of red tape and delay.

In order to maintain this vital fleet of several thousand executive aircraft (more than 1200 multi-engine) in first class shape for its increasingly important task of expediting defense production and for possible emergency operations, CAOA also has taken action to get company pilots placed on the Labor Department's cricical list of occupations.

Cole H. Morrow, Chief Plant Engineer of J. I. Case Company, Racine, and chairman of the CAOA Technical Committee, presented the facts to Mr. Coates, chairman of the Department of Labor's Committee on Critical Occupations. He also prepared a seven-page Special Technical Committee Report on "Delay in Recall of Military Reservists" giving the detailed procedure to be followed in the case of pilot reservists in the U. S. Air Force Reserve, Army Reserve, Naval Reserve, Marine Corps Reserve, and the National Guard. This report was sent to all CAOA members, and copies are available upon request to any company operating aircraft in connection with business. A number of such have already been sent.

In February Labor's Critical Occupation Committee placed commercial pilots flying company-operated multi-engine aircraft on the list of critical occupations, under Category A. This is the top classification and covers "A Reservist principally employed or engaged in a critical occupation in an essential activity."

With this established, companies may now proceed with requests for deferment or delay in calls to active duty for their pilots in the organized reserves.

Mr. Coates' committee requested more information in connection with the additi of pilots of single-engine company aircr to the list, and this is now being present

New Members

The following companies have been cepted as members of the Corporation A craft Owners Association. Several oth applications are being processed.

Ideal Cement Company, Denver, Colo., H been operating aircraft in connection w its business for more than five years. Pr ent equipment is a Douglas DC-3C. C Dobbins is Exec. Vice President and Gene Manager of the company, and Forest Conover (ATR 54709) is Chief Pilot.

The Procter and Gamble Company, C cinnati, Ohio, the well-known manufactur of detergents and edible oils, recently quired a Douglas DC-3 and C-47. The aircraft will be based at the Lunken Airpo and company operation is expected to beg in May. Preliminary planning has been und the direction of John Brush, Associate Ch Engineer of the company.

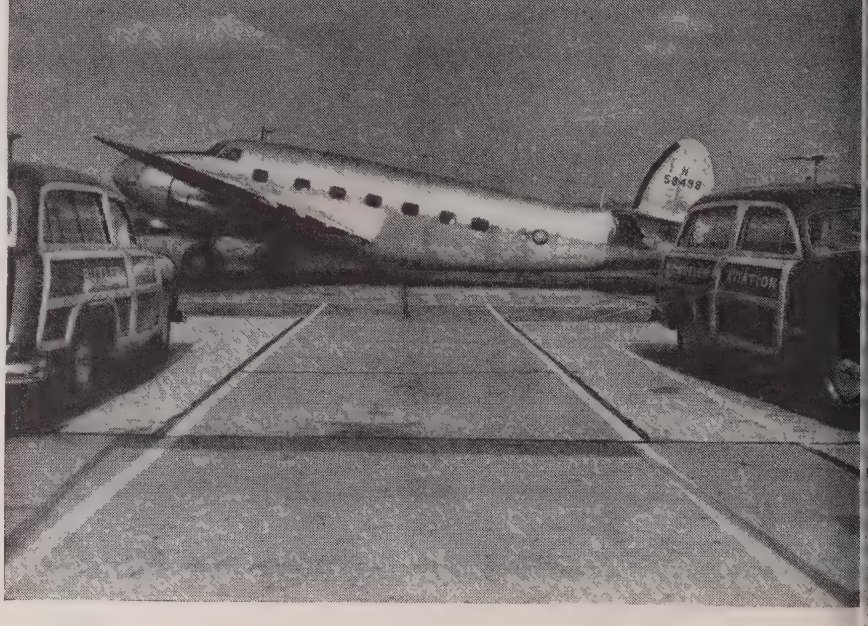
Twin Disc Clutch Company of Racin Wis., has operated aircraft since 1938. T present equipment consists of a Beechcr AT-11 and Cessna 190, based at the Horlic Racine Airport (see separate note on th development). President John H. Batte who holds commercial license 37709, w represent the company at CAOA meetin Verl J. Foss (334918) is the company pil

Spring Conferences

A joint paper on "Executive Aircr Problems in the Emergency" by the Ex Sec. and the Chairman of the Technic Committee was presented at the Third C ference of National Aviation Organizatio in Washington on March 19th.

At the meeting a team of five spoke f various user groups, including Navy, A Force, Air Carriers, Private Flyers and E ecutive Flyers. The paper on Executive F ers was presented by Cole H. Morrow. Cop of these papers will be sent to CAOA me bers.

BUTLER AVIATION serves executive aircraft operators at Washington National Airp and at Chicago Airport. Station wagons from field to town are part of serv



ighters for Defense

(*Continued from page 12*)

very expensive, far-flung network of
ar stations and lookout posts to spot
approach of enemy bombers. This is,
course, closely tied in with Canada's
wing air defense setup. Actually the first
of this vital radar net eventually will
ude sea-surface and airborne elements
h as Navy radar picket ships and modified
otune patrol planes of the POW variety.
Lockheed PO-IW is equipped with the
st advanced and highly sensitive airborne
ar gear in existence. All this is early warn-
radar.

n addition to early warning of impending
ck, radar and radio equipment behind the
y warning net is required so as to inter-
t the attacking force with fast climbing
fighters. These interceptor-fighters must
so controlled as to insure attack against
many of the enemy bombers as possible
ore their arrival over our vital industrial
population centers and strategic air
es from which prompt and devastating
liatory long-range bombing attacks could
aunched against the enemy's war-making
abilities. This is control radar, or GCI
ound Controlled Interception).

adar has at least one definite limitation,
ever. Its pear-shaped beams reach out for
y miles in straight lines, but they can-
follow the curve of the earth's surface.
VHF or UHF radio pulses, radar is
ntially line-of-sight in its operation. To
these radar gaps against bombing or re-
aissance missions by the enemy at low
a volunteer civilian Aircraft Warning
ice (AWS) has been organized.

his falls into two groups. One group, the
aft spotters known as the Ground Ob-
r Corps, mans lookout posts placed
t eight miles apart. The other group
s filter centers, of which there is one
very 300 outposts. The main job of the
station is to evaluate the spotter's re-
, weeding out the false alarms. As each
t from a spotter is phoned in (AT&T
eavily involved in our Air Defense
m), it is marked on a filter board.
n three reports on the same plane from
different lookout posts have been
ed on the board, the report is regarded
"positive" and is shot through to the
st Air Force GCI station. GCI checks
the CAA's schedule of flights. This
ule of flights includes those of scheduled
non-scheduled airlines, air freight car-
company or executive planes, personal
ft and training flights. This illustrates
importance of civilian airmen filing
plans under present emergency con-
s. If it cannot identify the plane, GCI
sts fighters from nearby AF bases to
and have a look.

s brings us to the second component of
ir Defense System—the fighter force.
force must be large enough to insure a
able capability of attack against enemy
ng forces along all probable avenues
ack. At the end of fiscal '50 (which
ust a few days after the Korean war
off) the Air Force had 20 squadrons
ed to air defense. There are 25 fighter-
ptors to a squadron, three squadrons
roup, often organized as a wing. Thus,
0 there probably were between 400 and
terceptors, mostly such jet day fighters

MARINE OFFICERS-TO-BE demonstrate the technique of landing by the USMC's "Flying Bananas." This photo was made during field graduation exercises held at Quantico, Virginia, where fledgling Leatherneck officers took part in a 60-hour "war" to demonstrate lessons learned in previous training term

as F-84 *Thunderjets* and F-86A *Sabres*. There were at least two all-weather fighter wings—the 325th at McChord AF Base, Tacoma, Wash., and the 52nd at McGuire AFB, Fort Dix, N. J. These were the first to be equipped with the all-weather fighter version of the Lockheed *Shooting Star*, the F-94—a high-altitude two-seater fighter with extended nose section for its radar equipment, and an afterburner jet engine for rapid climb and bursts of speed in combat. The latest version is powered by the P&W J-48 jet engine which has a "hot" rating of 8,000 pounds thrust.

As the Air Force expands toward its goal of between 95 and 100 groups or wings (7,000 to 7500 planes), it is expected that between 15 and 20 wings will be assigned to the Air Defense Command, which will mean a total of between 1100 and 1500 planes—a good proportion of them all-weather interceptors.

Besides the Lockheed F-94, which is now in good production, thanks to its many parts and components in common with F-89 and T-33 parts and components, some deliveries of the North American F-86D all-weather interceptor version of the *Sabre* are now being made. This model has a radar "snooper" nose, with the air intake for the powerful GE J-47 afterburner jet engine dropped below it.

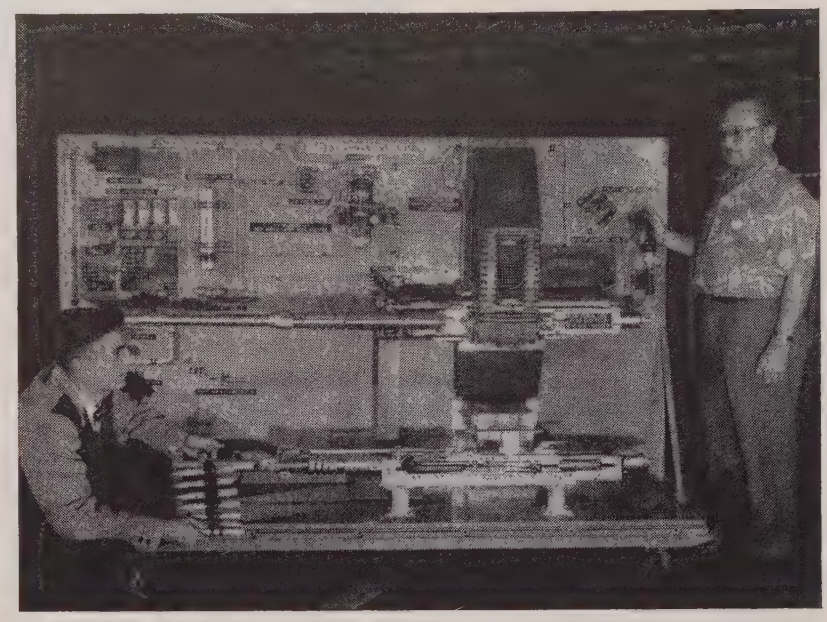
Biggest and most powerful of the all-weather interceptors is the Northrop F-89 twin-jet *Scorpion*, successor to the wartime P-61 *Black Widow* night fighter, first airplane equipped with the sensitive SCR-720 airborne intercept radar set. The Allison J-35-powered *Scorpion* is now starting to come off the production line. In announcing a greatly increased F-89 order, Air Force Secretary Thomas K. Finletter called attention to the importance of the *Scorpion* in the nation's air defense plans.

The Navy also has an all-weather twin-jet fighter, the Douglas F3D *Skyknight*, which mounts four 20-mm cannon. It is powered by advanced versions of the highly efficient Westinghouse J-34 axial-flow turbojet. Deliveries of the *Skyknight* have begun and the Navy hopes to have some of them operating off carriers before the end of 1951. They would be available to implement U. S. air defense and/or for service in foreign waters near other trouble spots.

All of these jet interceptor-fighters are in the 600-mph class or better and can operate in most kinds of weather. Besides the specialized AI (airborne intercept) radar sets, they carry all the latest electronic equipment for challenging aircraft (IFF—identification, friend or foe); fire control radar for aiming and firing guns, cannon and rockets; and navigational aids such as the Sperry Zero Reader and Lear F-5 lightweight autopilot. They are expected to be a match for the Soviet version of the B-29, the only really long-range bomber we know to be in the enemy's hands in considerable quantities.

It is a fact that fast, high-level Russian jet bombers are under development, and it is only a question of time when enough of them will be available for atom bomb attacks against special targets, either by refueling techniques or other developments for increasing range. To meet this threat, specialized sonic-speed interceptors with very rapid climb to 50,000 or 60,000 feet, firing radar-aimed airborne rocket guided missiles, are being

(*Continued on page 38*)



FIREPOWER of Northrop F-89 *Scorpion* is illustrated by this typical gun mount showing 20-mm cannon with controls, ammunition, and electrical systems, etc.

Fighters for Defense

(*Continued from page 37*)

developed. Attacking the enemy's jet bombers will be strictly a one-pass operation. Ground-to-air pilotless aircraft, such as the Boeing GAPA, will be the stage after that.

The final line of defense against enemy bombers is furnished by the Army's antiaircraft artillery. The same bill which set up the Air Defense Command as a top-level command did the same thing for the AAA (also the Tactical Air Command for close cooperation with ground forces). This is the Army element of the joint Air Force-Army air defense team. Corresponding to the Eastern Air Defense Force is an Army Eastern AAA Command, and to the WADF, a Western AAA Command, with AAA units attached to the various Air Defense Centers.

Thus, where fighter-interceptors traveling in three dimensions at high speed are our best *area* defense weapon, gun and automatic weapon fire provide a good *point* defense. The radar net and fighter force must be supplemented with the establishment of gun, and perhaps in the not too distant future, guided-missile defense around vital point targets. In certain areas the Navy also fits into the air defense system by making available naval radar, carrier fighters, and ship- and shore-based antiaircraft weapons when they can be spared from the Navy's primary missions of protecting the sea lanes and antisubmarine warfare.

The equipment of an Antiaircraft Artillery Battery is impressive. There are four 70-ton 120-mm mobile guns, aimed by electronic fire computers, which can send 50-pound projectiles to a height of 40,000 feet. An improved version of the highly versatile wartime SCR-584 radar detects the approach of enemy planes, and ties in with the truck-mounted fire director. The AAA-584 "team" in England knocked down over 90 per cent of the V-1 buzz bombs after the first few weeks. Against low-level attacks by plane, the battery has 16 .50-cal machine guns on four power-operated rotating gun mounts. A fleet of trucks and tractors gives the unit mobility.

Recently, the Air Defense System underwent large-scale tests on both the west coast and east coast. In the west the "enemy bombers" were dispatched by the Strategic Air Command, directed by Lt. Gen. Curtis E. LeMay, with headquarters at Offutt AFB, Omaha. Jet fighter planes of the Western Air Defense Force under Maj. Gen. Hugo P. Rush zoomed off the runways at Hamilton AFB to intercept the bombers as they picked their way through a curtain of radar and ground observer stations to "strike" at key targets in the Far West.

The Western Air Defense Force reported that several of the heavy bombers had been intercepted at high level in the 11 western states, but that, as had been expected, some had gotten through. General Rush stated that the WADF was not trying to prove anything in percentages, but was only interested in constantly improving the effectiveness of the system. "Our force has improved a great deal during the past year," he concluded.

Following the four-day test in the West, the East put on their four-day show, the most intensive peacetime test yet carried out. Some 600 "enemy" bombers and "friendly" fighters took part in the activities. Air Force bombers and jet fighters, Navy interceptors, RCAF *Vampire* jets and Air National Guard and Reserve planes flew about 3,000 sorties.

Activities in which attacking bombers (including B-29's and B-50's, and B-45 jet bombers) attempted to penetrate a network of ground observer posts, radar installations, defending interceptor-fighters and antiaircraft artillery were directed by Maj. Gen. Frederic H. Smith, Jr., commander of EADF.

Simulated bomber and fighter activity was scattered over the Atlantic Coast and the Great Lakes areas, with most of the repor air battles taking place in the skies o Boston, New York, Pittsburgh, Clevela and Detroit.

More than 150,000 spotters of the Grou Observer Corps manned 2700 lookout p in 21 states, sent in some 48,000 individ location reports of aircraft, and the 19 fi stations in the network wove these rep into a total of 6700 definite "tracks" relayed them to Air Force GCI station

EADF headquarters succinctly stated t the results of the tests were "very satis tory." No report of how many "attacki bombers got through was offered. In gene the results of both series of tests dem strated the truth of General Vandenbe recent statements that in a determined atta some enemy bombers would get through

Maj. Gen. Frederic H. Smith, Jr., c mander of the Eastern Air Defense Fo thus summarizes our Air Defense System presently set up. "I feel that we must assu that we will receive no definite warning impending attack in advance of its detect by our radar net. This means that we have available only those forces which in being and on the alert. While under c tinued attack we may be unable to emp our reserve components; we must have s cient forces in being in the regular est lishment to counter the first wave.

"By counter, we do not mean prevent attacks upon our important targets, for nation can afford to maintain a force being which would guarantee that a pr erly employed bomber force would be una to reach any of its objectives. No All bombing attack of any consequence failed reach its objective in World War II, e when the German fighter force was at height and we had not developed es fighters of sufficient range to accompany bombardment.

"What then is our objective? Our ob tive, through military and civilian teamw is the building of adequate radar protect fighter forces, antiaircraft artillery, and cient civilian passive defense in target ar Attainment of this objective would m that 1) enemy losses would first pre him from knocking us out in an in series of attacks, and 2) force him to b off such attacks.

"To put it bluntly, we must be cer that the United States can get up off floor after that first atomic attack w many of us believe will be the inaug move of World War III, and then punch way to victory. We must not be Mag Line-minded, for it is possible that by con trating too completely on defense we m not preserve those resources essential t able to counter-punch.

"In air warfare perhaps even more tha other fields of conflict, the offense is al the best defense. We must preserve a c bility to strike back against an aggr with a powerful strategic air offensive. Ir event of war against a foe who poss almost limitless manpower, we must m it difficult, if not impossible, to supply manpower with the means of fighting tively. On the air defense side, there we must create in being that minimum (our Strategic Air Command) which enable us, after attack, to carry out our air offensive and subsequently supply maintain our land, sea and air forces w are all essential to ultimate victory."

ANOTHER CONVAIR "FIRST"!

The USAF T-29, the navigational trainer version of the world-famed Convair-Liner, is rolling off the production line in steadily increasing numbers.

The T-29 "Flying Classroom" is the only plane in the U. S. Air Force that gives in-flight training to 14 students at one time, furnishing each with a full complement of radar and navigational equipment. *Records show that the Convair T-29 is turning out more and better-trained navigator-bombardiers in less time than ever before in air training history!*

The T-29 is another "first" in a long line of famous Convaircraft and is proving again that top airframe design and production originate at Convair.

IN THE AIR -- IT'S CONVAIR*

*REG. U. S. PAT. OFF.

NSOLIDATED VULTEE
CRAFT CORPORATION

FORT WORTH, TEXAS
SAN DIEGO CALIFORNIA

Forgotten Pilots

(*Continued from page 15*)

without brakes, but we have room to spare there.

There's a lot of super hush-hush work going on at Muroc, and an M.P. usually collars us as soon as we step out of our airplane—even though we work for Lockheed—and escorts us until we either fly our production ship back home or return on the daily DC-3 shuttle to the factory.

One of the more interesting mal-functions, which hardly ever happens these days, is a "flame-out" at high altitude. Alex Black had the last one. Alex started flying for Lockheed more than 11 years ago and has been on the production line since the old *Hudsons, Venturas, Lodestars,* P-38's, etc. He's been flying since 1917—12,000 hours in the air, including a session of flying fresh fish from San Francisco to inland cities back in 1922, just to make a few dollars.

Back in the early days of the F-80, Alex had a "flame out" at 40,000 feet. When the engine dies, there is no cabin pressurization and the cabin heat disappears. Moisture from the pilot's breath at 68° below zero F condenses on the inside of the canopy and there you are—flying blind.

"The pilot is at a slight disadvantage under these conditions," said Alex soberly. "If he turns on the high intensity cabin heater to defrost the windshield, he may not have enough electrical energy left in his battery to re-start his engine or keep his radio operative. When my engine cut out, I rolled over and headed for Muroc with the dive flaps full out. It seemed ages before I could see again and the altimeter unwound below 20,000 feet before things began to thaw out enough to cut the inside frost. Fortunately, the highest mountain in California is only 14,495 feet above sea level. At lower altitudes there's no serious problem in an air-start of the engine, but it's sure lonesome up there with a coating of ice inside the canopy."

As a direct result of this experience, newer models have an electrically driven stand-by heater, something like a hair dryer, to defrost the windshields.

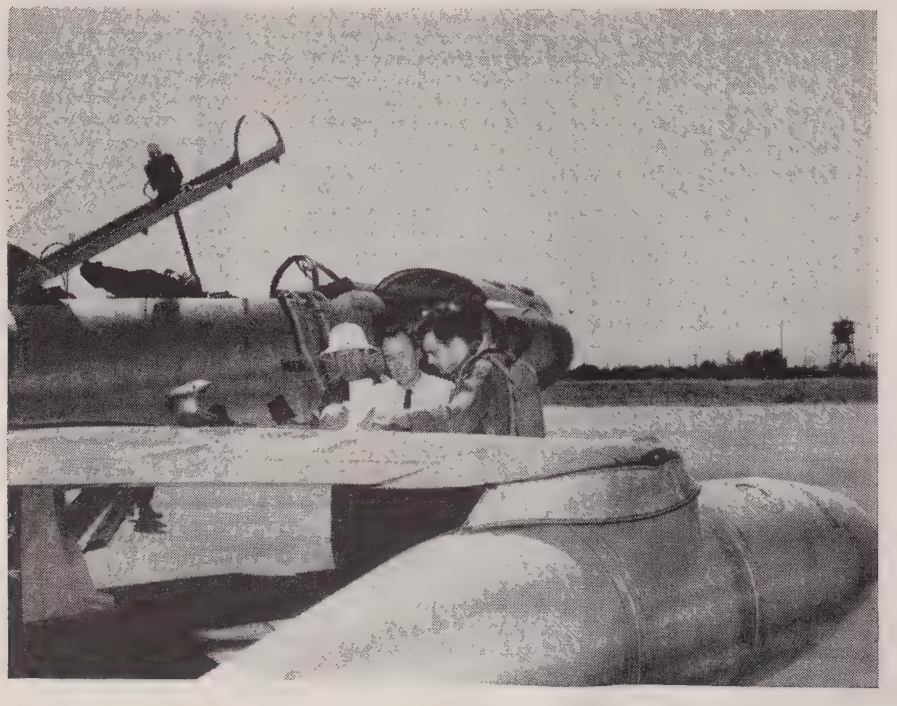
All of our jet pilots have been through the Air Force pressure tanks at Wright Field. We've had the "explosive decompression" test where you go from a theoretical 8,000 feet to 22,000 feet in about one second. If we have an actual pressurization leak, it usually takes 30 to 40 seconds to completely de-pressurize the cabin. We never fly with a bad cold because it can be very painful to the pilot if the cabin pressure leaks out.

Also, we've all ridden the ejection seat at Wright Field. Two rails go up about 70 feet on the side of one of the big hangars and the explosion of the charge under the seat will blow you some 50 feet up the rails. It produces a momentary force of about 16 g's, but there is absolutely no discomfort. We all have a lot more confidence in these ejection seats after having had the opportunity to try them.

A production test pilot, at least in jets, doesn't fly too much. I average only 35 to 40 hours a month and my hops in the new F-94 are usually under an hour in length. The later F-80's averaged only two or three hops before all the "bugs" were worked out, but the first planes off the production line took as many as 12 to 15 flights to dig out all the mal-functions. The longer a ship has been in production, the fewer problems we have out on the flight line. All of us are checked-out by the Air Force so that we can fly acceptance checks and turn the new plane over for actual delivery.

Our "first flights" check all the complicated equipment that goes into a modern fighter plane. We usually make a series of slow rolls to check the aileron boost, and a full-power run in level flight to see that the instruments calibrate correctly. Then we go up to altitude and check the cabin pressurization and heaters.

PRODUCTION PILOT Ted Limmer goes over details of test flight in an Air Force F-94 with Lockheed dispatcher. Ted, 26 years old, is youngest of Lockheed production pilots



I always stall every airplane on every flight—just for insurance. Naturally, a pilot will stall a brand new ship to find out where it pays off, but I slow down and make a stall even on second production-and-acceptance flights because there's always a chance of picking up a bug in the airspeed indicator and coming in 30 mph too slow for a landing.

On the first flights of any production model, the pilot must be ready for almost anything.

One day I was gunning along just above an overcast, indicating over 400 mph in an F-80, when my trim-tab jammed full nose down. At that speed, there's a whale of a lot of load on the stick and I dumped down through the "soup." I cut the power instinctively and popped the dive flaps to slow the ship up to a speed where I could control it. I came out under the clouds, still in a steep dive, but slowing up to a speed where I could handle the stick and regain level flight.

Once in a while we'll catch a ship with the trim-tab hooked up backwards. The elevator tab is hooked to a little switch on top of the control stick. When you thumb it back to raise the nose on take-off and the nose wheel bounces back onto the runway, you know immediately what is wrong. With the 6,000-foot runway here at Van Nuys, you're committed to take-off as soon as you're one third of the way down the runway, but at slow speeds there's no problem in overpowering the trim tabs.

The factory furnishes all our flight equipment except flying suits. The Lombard crash helmets we wear cost Lockheed over $200 each, but they're moulded specially to our heads by Protection Inc. in Inglewood. These helmets are made from spun glass and can take a terrific jolt without breaking; yet they're very comfortable to wear as long as they fit well. When Charles Tucker was flying for us, the canopy came off an early jet and jammed cock-eyed across the cockpit for an instant before it blew away. When Tucker landed, he had a big dent in his helmet, but he wasn't injured.

Our production test flights include radar and chase flights, checks for noise level, radio equipment and occasionally an air-fire test on armament from high altitude to make sure that the gun action doesn't freeze up in the extreme cold that high up.

One of our ever-present problems is high temperature in the cockpit. Since Lockheed built the first production jets, we were the first group of pilots to run into the problem of heat generated by skin friction at high speeds. Our cockpits would get up to 160° F on a high-speed low pass if we didn't have an excellent cockpit refrigeration unit. As it is, we usually climb out wringing wet after each flight because of the heat inside the cockpit on the ground.

The youngest member of our grey-headed outfit is 26-year-old Ted Limmer. He came to work recently when we were shopping around for a pilot with Navy training. Limmer had four years of combat experience off the flight deck of a carrier, even though his total flight time is under 1300 hours. His check-out is typical of what a new production test pilot does these days. There's an Air Force regulation that any jet pilot must have 15 hours dual before he's qualified to solo—so we put Ted in the back seat of our T-33 two-place trainer and let him learn both the cockpit procedure and the routine of shake-down testing. The jets themselves are re-

ably easy to fly; it's just a question of familiar with the correct cockpit dure.

d was up solo the other day in an F-94 he began to smell smoke that was ır to burning rags. Alex Black, up in er ship, got on the radio and told him to do. He had Ted check his generator he correct output and then had him off a stuck cabin heater switch. The e disappeared and Ted came home ut any more trouble.

ıen we built our first jets, there were no lace jobs so most of us here at Lock- checked ourselves out in production ınes. We became as familiar as possible the cockpit procedure on our original ls and then went up to "the lake" for r three flights to get the feel of take-off landing in the faster ships. Then we back here to Van Nuys and Burbank we've been flying them ever since. rally, the two-place T-33 makes for a more efficient check-out.

th the hazy, smog-filled days we have ently, light airplanes are quite a prob- n the traffic pattern. With tne 150 mph se in the pattern, it's almost impossible ot a *Cub* flying at 60 mph, but there is er cent radio control both at Van Nuys Burbank and the control tower frequently them out of the pattern for us. When low on fuel in an F-94, you don't anything but to get back on the ground fast! No doubt some of the lightplane get a little "t'd" off at us, but if they in the cockpit of a jet, I'm sure they'd stand.

usually fly a military pattern, *i.e.* a ast pass over the field with a steep o to lose speed and drop the gear. The will clear us in on a normal approach s type with lightplanes entering the ind leg because our speeds are so aat we beat them to the runway without k.

king with a company that has been in ss for many years makes production ing a lot easier than flying for a new Our key employees have been with eed for years and the inspectors on our ine know just where to look for trou- ere's no more of this stuff of having oxes left in air scoops, having planes for first flight with the tail assemblies rtially riveted into place and finding ents that weren't even connected. ne flight line says that a new ship to fly, there's no question about it. ig, heavy and complicated new planes many gages, gadgets and automatic ions that a pilot must have complete the ability of his crew chief and spector. If I were to try to check ng personally that might go wrong new military plane, I wouldn't fly week. Proof enough of the ability of ectors is the bumper crop of grey can be seen in our ready room.

nk that a little age helps make a t pilot," says Ray Meskimen. "It your sensibilities a little and the and noises don't make you jump so nother advantage for the older pilot articular job is that you don't have ny more g's than you want to, be- e pilots in the experimental test ave already proved that the airplane it."

pilots on the jet production line seem happy to stay there even though they're all checked out in Lockheed's P2V patrol bombers. "These little airplanes are so enjoyable—and you don't have to sit up there for four hours at a time," says Meskimen.

Actually test flying for production is just like any other type of piloting—with the added advantage of being able to stay home every evening with the wife and kids. All of our production test pilots are married and have families. True, we do the same thing every day and punch the same time card, but we also make it a point to stay one jump ahead of our equipment. Whether it's a *Cub* or an F-94, you have to stay ahead of your airplane or you're headed for trouble. You must stay sharp on the routine emergency procedures, make careful cockpit checks and know your airplane well enough to be able to trace trouble in flight and get it corrected without wasting any time.

In a way, it's like selling shoes, but when dispatcher Denny Cairns says, "Who's up next?" there's always a shot-in-the-arm that makes the job pay-off in more than just dollars and cents.

Since most of our products go directly to young military pilots, we make sure that they're right—all the way through—before they leave the factory flight line. And just as long as you don't see headlines about the forgotten factory pilots, you know that they're doing their job well.

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MORE SPEED

MORE CLIMB MORE CEILING

MORE SAVINGS

20 extra miles per operating hour on your C-47 or DC-3—20,000 free miles per engine change. You can save more than enough on one pair of engines to pay for your next engine change, and buy one free engine.

These engines are brand new—modified and guaranteed by Remmert-Werner, Inc. They are absolutely free of rust and corrosion—pickled, boxed and ready for shipment.

ALSO

Pratt & Whitney	R1830-92	$4000.00
Wright	R1820-60	$3000.00

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Rough-Air Flight

(*Continued from page 17*)

of 20 feet per second, the rising air imposes an inertia load upon the airplane structure. If the plane's airspeed is high, the affects of the inertia load are momentarily greater than if the airplane were flying slowly. Therefore, the airplane designer anticipates this condition by building an airframe capable of flying at high speed at rated gross weight through a rising or falling air mass having a velocity of 30 feet per second. But sometimes gusts attain a higher velocity than this.

The conventional air-gust loading requirements at normal rated gross weight and at level-flight high speed are based upon experimental data and the operation of civilian airplanes over a period of years. *Rising* air causes positive loads to be imposed on the wings, whereas *falling* air causes negative loads to be imposed on the wings. Generally speaking, the positive loads are the most severe and are the ones to be guarded against.

The load factor of a plane is defined as the ratio existing between the total imposed air load acting on the wings and the rated gross weight of the airplane itself. Load factors used as design criteria have been derived from previous aeronautical engineering experience and known design information, and are set forth in the CAA requirements for an ATC for a specific airplane. The wing structure is designed and built to sustain a total load equal to the rated gross weight of the airplane when multiplied by this load factor. In this load factor, inclusion of an anticipated gust load imposed by air gusts is made.

The letter "g" is used to refer to the force of gravity and is the engineering symbol for gravitational accelerations imposed on an airplane structure. However, whether the pilot or passengers are standing or sitting, each is subjected to the normal pull of gravity on the body which is equivalent to one "g." When forces are imposed on the body as a result of flight maneuvers or by turbulent air conditions, the forces of which the body is conscious are the result of an increase in the accelerational forces above one "g" or the normal pull of gravity upon the body. A person subjected to an acceleration equivalent to two load factors acting on the airplane does not actually experience the sensation of two load factors but only the affects of the force produced by the addition of one load factor not normally experienced.

The drawing *(Fig. 1)* on page 17 shows an airplane in level flight with the four basic forces acting in a state of constant equilibrium. Note that the total gross weight supported by the air load is the same as the gravitational pull imposed on the airplane. In turn, this is balanced by thrust and drag forces in order to maintain a condition of level flight. It is evident that if the air load was suddenly increased by the force of an air gust acting in a vertical direction, the additional air load (positive) would tend to accelerate the airplane. In order to maintain the condition of equilibrium, the weight of the airplane exhibits inertia which resists such sudden positive acceleration. Consequently, "bumps" are experienced in turbulent air. The severity of the bump is dictated by the level-flight speed at which the airplane is flying, and it is when these bumps become severe that the pilot must reduce his airspeed.

If the upward force on the wings is excessive, certain parts of the airplane structure may be overloaded to a point where actual distortion of the structure could occur.

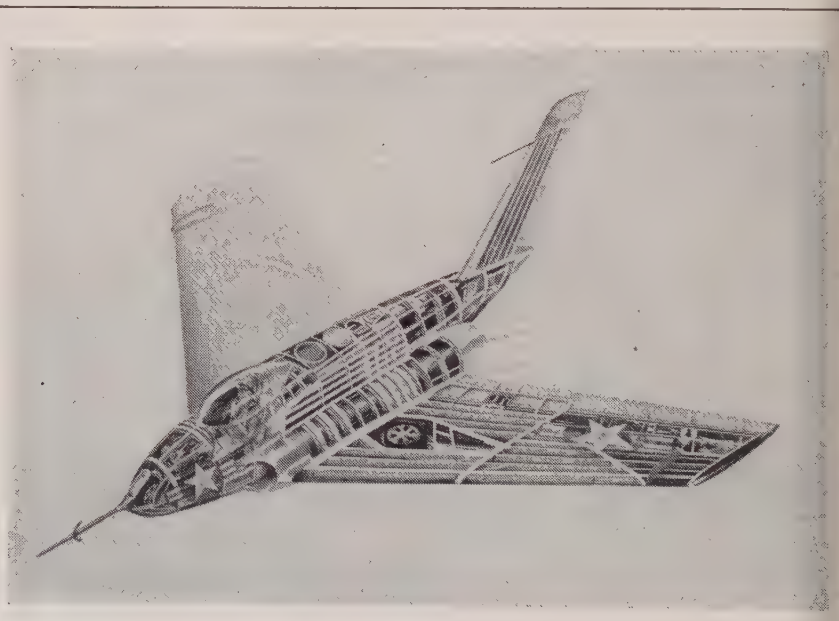
High speed with a maximum rated gross load are two factors that make flying in rough air hazardous—and a simple analogy shows up here. It is axiomatic that because an airplane has weight it also exhibits inertia. Visualize it this way: compare a heavy object being lifted by a cord that has sufficient tensile strength to support the object when it is hanging in an unsupported condition. However, if the cord is pulled up suddenly, the cord becomes taut and subsequently breaks. This breakage is caused by the inherent inertia of the object. For that matter, the cord actually may have been sufficiently strong to support several times the weight of the object, but the combination of the sudden jerk and the inertia developed in the object caused the cord to break. In this analogy, the jerk is equivalent to an accelerating force identical in effect to a suddenly applied load imposed on the wing of a plane when it encounters a vertical air gust.

The ratio of the total load on the string, including the accelerating force, to the gross weight of the object is the equivalent of a load factor. The ultimate load factor developed by the airplane wing, or the string in the analogy, is the maximum amou permitted before actual physical failure evident. Airplane gross weight and spe limitations in diving are purposely limit so that the allowable load factor will n be exceeded in normal flight maneuvers by air gusts, thus causing structural da age or possibly complete failure.

Actually, the two basic dangers in roug air flight are: 1. Overload—when the a plane is overloaded, the design load fact is proportionately reduced; 2. Excessiv speed—failure to reduce cruising speed, th causing greater load to be exerted on a craft structure.

Cautious piloting in rough air will much to alleviate the danger of air gu affects on wing structure. Actually, comm sense will do much to prevent the pilot inadvertent entry into dangerous flight co ditions. For example, flight near thunde heads in an area of violent air disturbanc is foolhardy and dangerous as far as mo personal airplanes are concerned. This because the design strength of the airpla is not such that can stand the violent forc encountered within thunderheads. In buil ing airplanes a "norm" had to be esta lished for design purposes in order to obta a satisfactory strength-to-weight ratio an to develop an airplane that could obta optimum performance and at the same tim economy of fuel consumption. Therefore, help the airplane perform its intended fun tion, a design compromise has had to made and assistance required from the pilo

(*Continued on page 59*)



Northrop X-4 Research Plane

Internal details of the USAF's "flying laboratory," the Northrop X-4 research airplane, are revealed for the first time in this phantom drawing of the tiny, lance-shaped plane. The fuselage of the X-4 is packed with equipment and instruments. Space for the pilot is reduced to a minimum in order to provide room for those instruments. Integral fuel tanks are built into the multi-cellular wing panels. The X-4 measures about 25 feet from wing tip to wing tip, and it is about 20 feet long. Distinguishing characteristics of the plane are its sweptback wings and the semi-tail which is without horizontal stabilizer. Plane is not intended to be supersonic but is for studying subsonic flight.

ed Star Air Force

(*Continued from page 19*)

15 appears to differ between machines. first production aircraft—in service y two years ago—were fitted with one n and one 30-mm cannon, whereas machines encountered over Korea re-lly carry one 37-mm weapon in addi-to supplementary armament of 20-mm 30-mm weapons. The MIG's based in any appear to carry two 30-mm and 20-mm weapons—one gun of each cali-mounted either side of the nosewheel ng. Any one of these armament combin-s is more potent that the six .50-caliber of the only comparable U. S. fighter, -86 *Sabre*.

ere is much evidence to support reports the Russian 30-mm gun is based upon German Mauser MG.213/C/30 cannon, was the greatest achievement in war-gun design, firing 1100 30-mm can-shells per minute. There is as yet no ft gun in the world equivalent to the 13 but, whether Russian guns are on this advanced German weapon or the Reds have always proved compe-gun designers; their cannon are re-ed as among the best in the world. s hope that those in charge of our air-armament will mark and note!

question of the type of turbojet in-l in the MIG-15 is still unresolved. The reports of a centrifugal unit based on lls-Royce *Nene* have not as yet been ntiated, and there are many who, g in mind the MIG's nose intake, be-n axial-flow unit is more likely to be Although a centrifugal unit such as *ene* would prove attractive to the Rus-both for reasons of simplicity as com-with an axial and its ability to stand harsher treatment, such a unit would e a plenum chamber to feed air to sides of its impeller and, unless d near to the nose intake, nose entries afford many problems. Consequently, brakes are almost universally used by owered fighters. However, exceptions Dassault *Ouragan* and the Pulqui II

only known Russian production axial-nit sufficiently powerful to give the 5 its 640- to 650-mph top speed is -012H, but the length (177 inches) eight (4,750 pounds) would appear ttive. The ability of the MIG-15 to away from its adversaries, and the and streams of white smoke that it while so doing, may indicate the use e form of rocket boost. It is, there-nceivable that the Reds have devel-he BMWOO3R (which consisted of dard BMWOO3A axial turbojet with dition of a BMW718 bi-fuel liquid giving a thrust of 2700 pounds for od of three minutes) to acceptable tion standards and, delivering ap-ly more power, this combined turbo-rocket may be installed in the

33-foot span fighter has 35° swept-ings (not 40° as was at first reported) s proved, in Korea, to have an ap-ly smaller turning circle than the ts superior maneuverability results he radical difference between the and American schools of thought

TWA
You can
SEE MORE, DO MORE
on a two weeks'
VACATION
when you go
TWA
Luxurious 300-mph TWA Skyliners serve the choice vacation areas of the world. For free folders on low-cost TWA tours, SEE YOUR TRAVEL AGENT or call Trans World Airlines.
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on the subject of wing, span and power loadings. While the Reds have gone all out for low loadings at whatever cost in order to permit high accelerations in turns and a high rate of climb—a goal achieved by keeping weight and internal equipment to a minimum and providing reasonably generous wing area—we in the USA have considered a high limiting Mach number to be the prime requisite. We have obtained this at the expense of altitude maneuverability. Wing, span and power loadings are high, but the F-86 is a steady gun platform owing to its implied freedom from compressibility. However, the greater maneuverability of the MIG-15 would enable its pilot to bring his guns to bear on the target with greater facility. As shown in our illustration, the latest MIG-15's feature four boundary layer fences on the wing upper surfaces. Air brakes, for greater combat flexibility and for slowing down the landing approach, are attached to the fuselage sides, under the tail.

A larger, sleeker machine is the Lavochkin, believed designated LA-17 which, although already in service in considerable numbers, is not as yet so widely used as the MIG. Spanning approximately 40 feet and having a length of 37 feet, the LA-17 is credited with a maximum speed of 630 mph and an armament of two cannon. Its wings are not so sharply swept as those of the MIG, sweep angle being 30°, and an unusual feature seen on latest ones is a long fin under the rear fuselage. All members of the nosewheel undercarriage retract into fuselage housings, thus leaving the shoulder-mounted wing free to carry fuel tanks. Bearing this fact in mind and taking into account the more rotund, capacious fuselage of the LA-17 as compared with the essentially short-range interceptor-type MIG-15, this aircraft may be intended for use as an escort on tactical bombing missions in the true Russian wartime tradition.

Backing these ultra-modern fighters are appreciable quantities of earlier jet fighters such as the MIG-9 and YAK-15. The latest version of the YAK-15, tentatively known as the YAK-15B, was mentioned in the January issue of SKYWAYS, and it is now possible to illustrate this development. Powered by a single M-OO4B turbojet (based on the Jumo CO4B), the YAK-15B is now known to have a maximum speed of approximately 505 mph at altitude and a cruising speed of 370 mph. According to the latest available photographs, armament has been increased to two cannon, probably of 30mm, and the nosewheel undercarriage, which replaces the tailwheel type of early production airplanes, and the redesigned fin and rudder are clearly shown in the accompanying illustration. Some YAK-15B's, probably an interim production version, are flying with a nosewheel undercarriage but the old-style curved fin and rudder.

Although this aircraft is undoubtedly due for replacement by the swept-wing MIG-15 and Lavochkin, it will no doubt figure prominently in the air war should an open clash develop between East and West. Even

(*Continued on page 47*)

Fido in the Dog House?

(*Continued from page 22*)

Research on high-pressure instantaneous burners was first conducted at Arcata, California, where both United and Southwestern Airlines operated successfully on the FIDO-equipped runway. J. W. Brown, director of Flight Operations for Southwest Airways, says, "Southwest has more actual experience in making adverse weather approaches than any other commercial airline. We would say that FIDO (at Arcata) is effective at least 98 per cent of the time."

Fog at Arcata blows across the airport from the sea at a consistent 5 or 6 mph. This condition exists about 70 per cent of the time when Arcata is fogged in, and it was a relatively simple matter to install burner lines that would intercept and dissipate the fog. After proving the efficiency of FIDO and other landing aids, the Arcata project was terminated.

Now the Los Angeles International Airport is the only FIDO laboratory for the Continental United States. This airport was chosen by a team of CAA, Airline Pilot Association and Air Transport Associations men who surveyed all large terminals. The deciding factor in favor of Los Angeles was that the airport owned the land on the approach end of the main instrument runway. In addition, zero-zero fog is not a complete rarity in Southern California.

Weather Bureau statistics show that the Los Angeles International Airport weather is below 500 feet and one mile 5 per cent of the time. By comparison, nearby Burbank is also 5 per cent, Arcata is below minimum 20 per cent, La Guardia 4 per cent, Pittsburgh 6 per cent, Greenburgh and West Virginia 7 per cent. The majority of below-minimum weather in Los Angeles occurs during the months of August, September, and January.

Statistics can be confusing on the percentage of the time that any airport is closed to operations because of weather. Sometimes a field is below minimums for landings but all right for take-off which requires less ceiling and visibility. However, that doesn't do the airlines much good because they can't get their planes on the ground to maintain their schedules.

When the weather gets bad in Los Angeles, it can be really stinking. Between November 19 and December 6, 1949, the field was closed to all operations for more than 151 hours. It was even dangerous to taxi aircraft. This figure is based on the lowest operating minimums: American Airlines DC-6's that are cleared to land with 200 feet and half a mile, and may take off with only one-fourth of a mile visibility. During this period, the fog ranged from under 50 feet of heavy ground fog to deep fog topped by stratus clouds up to about 1500 feet. Winds ranged from calm to any direction of the compass. Velocities were from zero to 10 mph. The whole picture is much more complicated than Arcata, where the fog nearly always blows from the ocean. So FIDO has the opportunity to do a really big job here —*if* it lives up to expectations.

Given the somewhat thankless job of salvaging FIDO is young Jack Egan, an ex-MATS C-54 pilot who was on the engineering staff at the Los Angeles Airport. Currently he is Superintendent of FIDO.

Through studies of relative heat output conducted jointly by the airport, airlines, CAA and Todd Shipyards who built the unit, the additional pipelines were recommended and built. Whenever a test 'burn" is made of FIDO, all automobile traffic in the vicinity comes to a halt. Planes c dashing in from all the Los Angeles are see who crashed and all North Amer Aircraft production in the factory ad ing the runway ceases while workers F-86's and T-28's watch the burners. Th fore, tests have been kept to an abs minimum.

Another reason for keeping test wor a minimum of two or three burners is relatively high cost of operation. The o nal system of 392 triads was designe burn 1,750 gallons of cheap diesel oil minute. The burning lines alone on the o nal installation hold 55,000 gallons of Original cost estimates were figured at \$150 to \$200 per landing, depending u wind conditions. The fact is sadly true just as in everything else, costs are hi than in the early months of 1949, and F is no exception. No cost-per-landing figu being quoted at the present time.

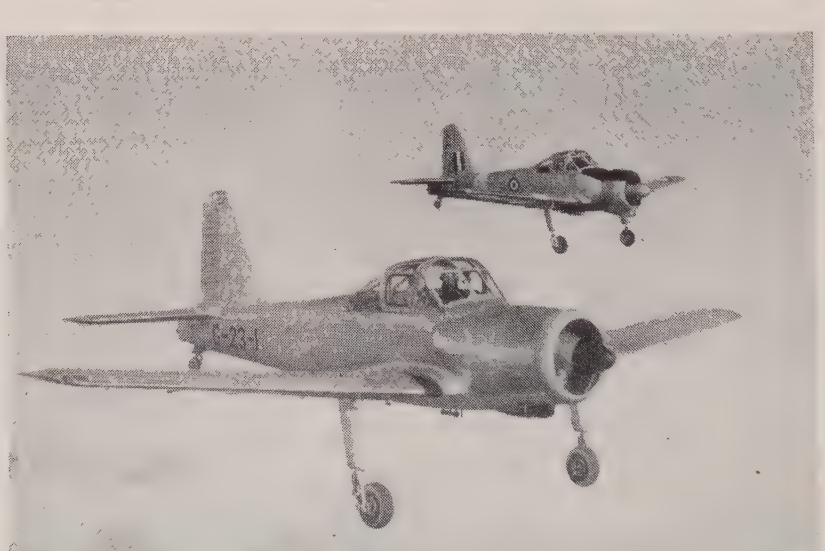
In addition to the regular cost-of-li price hikes, the FIDO installation will burn a lighter oil that costs about one per gallon more than the cheapest d oil. This higher quality fuel will not de quite the volume of heat of the original but it does produce less smoke. The Los geles City Fathers will be happy to note the lighter oil will produce much less "sm than the heavier fuel.

To assure complete combustion and inate smoking, the maze of burners placed from 12 to 14 inches above the gro The original installation had a low ban dirt adjoining one line of burners and triads always produced smoke. When dirt barrier was bulldozed out of the a more complete circulation of air prod smoke-free burning.

In relatively calm weather, only the new close-in lines will be needed. Wi parallel wind out of the west, the same in lines will do the job and with a wind Mr. Egan plans to use one close-in plus the new spur lines to take care o fog.

"There is no reason for any more pun capacity than we already have," says Egan. "There would never be a cond where it would be practical to turn o the burners at the same time."

Moving the burner lines closer to the way is the one major change in the FIDO installation. It was made only considerable study by both airline pilots CAA safety engineers. Both the ori British experiments and the Navy Amc installation had burners at 450 and 22 from the center line of the runway. At A the outside burner line was 375 feet the center of the runway and the inne was only 190 feet away. The new Los geles installation puts the inner lines 200 feet from the center of the runway largest plane now in commercial use 377 Boeing *Siratocruiser* has a wing sp 131 feet 3 inches with a main landing tread of 28 feet 6 inches. This will pu burners as close as 44 feet from the tip if the plane is not landed exactly middle of the runway. Safety enginee not apprehensive of this arrangement the whole system can be shut off in seconds. However, there does remain tential hazard since the burners heat roughly 500° F while putting out a fla 2200° F. Since the burners stick up 12 inches above the ground, they would



RAF Basic Trainer

The Percival P-56 has been adopted as a basic trainer by the Royal Air Force after months of trials. The P-56 is a side-by-side trainer powered by Armstrong Siddeley *Cheetah* or an Alvis *Leonides* engine. It has top speed of 172 mph when powered by the *Cheetah* engine, and 200 mph when powered by *Leonides*

l if hit by a landing aircraft that ran
e runway.
aking before a Los Angeles aviation
Del Rentzel, CAA Administrator said,
nsider that there is nothing inherently
with FIDO. We propose to overcome
ostacles. The objective of FIDO is re-
air transport. In most places the regu-
ds are sufficient, but I don't think that
ngeles will be complete without FIDO.
airports are watching FIDO here."
e FIDO is an expensive experiment,
iginal cost of the project was shared
CAA's Federal Aid to Airport pro-
and the Los Angeles City Department
ports. The city's share had been under-
n over a five-year period by five partici-
airlines who will also pay operating
aintenance costs. These major airlines
merican, Pan American, United, Trans-
, and Western. The CAA put up 54
nt of the additional $300,000 for im-
nents and the Los Angeles Airport
und furnished the remainder.
er scheduled operation, it is planned
he dispatcher of each airline would
o okay each FIDO burn after a radio-
one conference with his pilot in flight.
each airline would be billed for its
the installation. The FIDO team will
ur men to complete: one in the pump
to operate the two 1,000-hp electric
one in the control house adjoining
uchdown area of the main instrument
, one in the approach zone in case of
nical malfunction and one on the
check the burners. The foreman of
oup would be in the control house
he would monitor the plane's approach
rn on FIDO at the proper time.
O will have to be turned on at differ-
es for the different types of aircraft,
ing on their approach speed. An auto-
rapid-scanning ceilometer will record
ual ceiling at the touchdown point
t from the end of the runway.
use of the cost involved and the con-
resulting from scheduled airliners
at alternate airports, the fee for
ng FIDO is not the prime problem. If
will do the job, even though the cost
high, it will virtually eliminate the
y of sending busses to outlying fields
runtled passengers, do away with the
of re-scheduling outbound aircraft
the incoming plane couldn't get into
, and generally improve the efficiency
airlines in the eyes of the public.
the expenditure of well over a mil-
lars has yet to produce a single fog-
ding at the Los Angeles International
the various agencies and airlines
ve invested money in the project are
discouraged. FIDO is actually the
five low-visibility landing aids at the
geles Airport. The other four—ILS,
dopeline approach lights and high-
runway lights—are all either in
n now or nearing completion. The
of an efficient FIDO system will
os Angeles "open for business" under
lly any conceivable weather condi-
FIDO can be made to work efficiently
Angeles, it will work just about any-
The benefits in on-time airline sched-
l more than justify the cost of this,
l big-time experiment for FIDO.
put FIDO in the dog house until
a good chance to show what it can

ITALIAN ULTRA-LIGHTPLANE is the MF-1 *Passero (Sparrow)*, a one-seater powered by either a 22-hp Ambrosini engine or a 20-hp Macchi engine. This one has a 22-hp Ambrosini. It has a top speed of 94 mph and lands at 34 mph. Its rate of climb is given as 492 fpm; range, 217 miles; service ceiling, 9,840 feet. The *Sparrow* has an empty weight of 286 pounds; wing span is 22 feet 11 inches

Sky Spieler

(*Continued from page 23*)

and pull him back into the plane. "Uncle Sam needs this ship for training more guys like you. Now land her," Joe commanded. The kid was nervous, but Joe directed him into a creditable forced landing in a nearby field.

During his 3500 hours in the air, Joe has made 13 forced landings. A couple of times, the motor failed because of water condensation in the gas tank. More often, though, Joe ruefully admits the failure was his own fault. "If you forget the heat control, you can't blame the carburetor for icing." Once, he landed on a dual highway near Spartanburg, South Carolina. That's why Joe prefers lightplanes. "A lightplane can always land somewhere!" he explains.

After the war, Frisco bought a surplus PT-19. He made flying a sort of paying hobby by flying pay loads whenever he could find them. This, however, was too uncertain and Joe assembled his present advertising outfit in the fall of 1949. Churches, politicians, auto dealers and merchants use his advertising services. Joe charges $60 per hour, but advertisers usually buy only portions of an hour. To date Joe has had between 30 and 40 customers. Advertisers apparently realize results from his work . . . they come back for more.

His voice is carried by a 25-watt Masco mobile unit sound system with a 6-volt, 197-ampere-hour battery to supply power. The speaker is mounted on the wing struts. This outfit is installed in a three-place Piper *Cruiser* fully equipped with radio, landing lights and all the necessary instruments for night flying in a lightplane.

One enterprising refreshment-stand operator had Frisco fly over town during a parade. The amplifier boomed glad tidings of hot dogs and soft drinks to hundreds of hungry spectators.

His most unusual job, though, was the glass company call for the return of workers. The union had been on strike two weeks and, because the company is the largest manufacturer in the area, the whole community was beginning to feel the pinch. Saturday, the company and union reached an agreement. Word had to be spread to a wide area in a hurry if the 2,000 workers were to be back at work Monday. Newspapers couldn't do the job in time. Radio wouldn't reach everyone. But Frisco Aerial Advertising could . . . and did. It took six hours to cover the territory, and all but a few who were visiting far from home heard the report and were in the plant Monday morning.

On first hearing the Frisco ads, many think a sound truck is touring the neighborhood. Yet, it is different. The message seems to pervade the atmosphere, eliminating the echoes and distortions usually associated with sound truck announcements.

The sky spieler has a great deal of sympathy for his listening audience, however. He refuses advertisers who want to reach summer resort vacationists before noon. Joe reasons that folks who have paid a good sum for a short period of rest and relaxation have earned the right to undisturbed slumber if they want it. How often have you wished neighbors with a new television set would show as much consideration?

Equipment for this aerial ad announcing is rather expensive but it need not be permanently installed in the plane. Frisco simply lays the mobile unit on the rear seat with the battery on the deck behind the pilot's seat. The microphone hangs from a hook above the windshield. The loudspeaker is simply bolted to the wing struts. When Joe takes off for a pleasure trip or flies a couple of passengers to Florida, he can remove all the speaker equipment in a few moments.

Joe Frisco is one fellow who has successfully combined a profitable business with a comparatively inexpensive pleasure.

Wild Guy in an OY

(*Continued from page 25*)

forward. But the horde was too many. On the third morning there was nothing left but wrecked vehicles on the road and Reds probing among them like rats in a pile of litter. The Marines in the convoy had been taken prisoner.

"That made me so mad I dropped some fragmentation grenades on them," he said. "There are a few of those Red rats who won't poke around anymore where they don't belong."

This peaceful-looking but wild guy in the OY felt better a few days later when he led 11 air strikes one afternoon to help the Fifth and Seventh Marines to fight out of heavy enemy encirclements on the western edge of Chosin reservoir to join up with the Headquarters of the First Marine Division at Hagaru-ri.

Lieut. Akin was with him again that day as observer.

As the troops pushed toward Hagaru-ri the little fabric-covered OY putted ahead of the point of the column to locate hidden enemy road-blocks, troop concentrations, and mortars. When it located them, it dove down to drop marker grenades on the targets and then circled off to the side, directing in the fighters.

McCaleb and Akin also worked with the Marines scrambling and fighting up and down the steep and wooded ridge-tops flanking the road, to seize all the high ground commanding the convoy's route. The OY had radio contact with both the troops on the ground and the planes above.

Fighter planes were stacked up, waiting for their turn to attack. McCaleb directed Air Force F-51 *Mustangs* and Navy AD attack bombers as well as the Marine *Corsairs*. The planes swarmed like angry bees in the skies above.

"The Marines on the ground couldn't see what was ahead." McCaleb explained. "The fighters were orbittin' up too high to see, but ready to pounce. It was up to Akin and me to decide on the targets and whether to have the fighters hit them with napalm, frag bombs, rockets, or strafing. It sho' gave me a feeling of satisfaction to see those two fightin' regiments join up with the Divvy at Hagaru-ri that evenin'."

McCaleb feels a little apologetic, flying a light observation plane. He is a World War II experienced fighter pilot with 150 carrier landings to his credit. More than 1600 of his 2,150 flying hours have been in *Corsairs*. His tour with the VMO-6 observation squadron has been the routine change of duty that every Marine fighter pilot must expect now and then.

The 28-year-old pilot is 5 feet 11 inches tall—slightly round-shouldered from squeezing into the tiny OY. His dark hair is starting to get a little thin in the front. Although he considers himself a good Marine, he is actually an Army "brat." His father is Col. Alfred F. McCaleb, Sr., Chief of Staff, 39th Division, Louisiana National Guard.

He is strictly "Southern" through and through. He was born in New Orleans, majored in geology at Louisiana State University before quitting to get into Marine aviation at the start of World War II, and is married to a Floridian, the former Annette Baber of Green Cove Springs, Florida. He is a family man, with two boys 6 and 3 years of age, and a girl, 4.

Being a Regular Marine Officer, his combat flying is a "job" for him instead of an adventure.

One day when the Marines' Fifth and Seventh Regiments were still in the Yudam-ni area, McCaleb directed both artillery fire and air strikes on enemy positions encircling them. A heavy snow storm had delayed take-offs that morning, so he worked hard until dusk, using Hagaru-ri as a temporary base. Just as he was getting ready to fly back to Yonpo for the night he was informed that an encircled Marine unit at Yudam-ni was suffering heavy casualties. They had one wounded Marine who would die if he wasn't brought to a hospital immediately. There were no helicopters available. Could he fly the wounded man out in the OY?

McCaleb's observer volunteered to stay overnight at Hagaru-ri and Mac took off to get the man. It was getting dark and the OY wasn't equipped for instrument flying. Furthermore, his engine was throwing oil. It filmed up his windshield. He could barely see out of it.

But, craning his neck out of his side hatch like a railroad engineer, he was able to keep away from the dark masses which were the mountains and, guided by the silver gleam of the reservoir, he navigated by guess to a point on the shoreline adjacent to Yudam-ni. He then flew inland at an altitude which would clear the mountain tops.

Yudam-ni was covered with smoke which saturated the valley. But through the haze McCaleb saw two bonfires. Assisted by radio directions from the forward air controller with the regiment, he glided down between the dark ridges. Then McCaleb saw the Marines alongside a makeshift landing strip. He set his plane down by the light of the fires.

Capt. John DeCloud of the Seventh Marines said, "That flight of Mac's at dark into that valley, dense with battle smoke, was one of the best jobs of flying I've ever seen. He was practically GCA'd in, and he with no instruments."

With the wounded man aboard in a stretcher, McCaleb again took off into smoky darkness, maintained his flying a tude with one eye on the bonfires until could see the dim mountain-top horizon, a threaded his way out of the dark canyon fly 55 miles over Communist-held peaks land on an icy runway at Yonpo. His n was in a hospital an hour and a half af the take-off from the plateau.

After a good shudder, a can of beer, a hot chow, McCaleb said, "That was scariest landing and take-off I've ever ma in my life. I really shouldn't have done but somehow I figured I could make it."

Later, as the fighting foot Marines steac moved their men, wounded, and equipm through mountains teeming with Chine they suffered more and more casualties.

"Just keep bringing us ammo and medi supplies and rations and we'll get out this mess," they told their fly-boys.

With the fighting flaming on all sides them the Leatherneck engineers started grade out a rough landing strip at Koto so that the beleaguered forces could rec more ammunition and supplies by airlift well as fly out their mounting casualties.

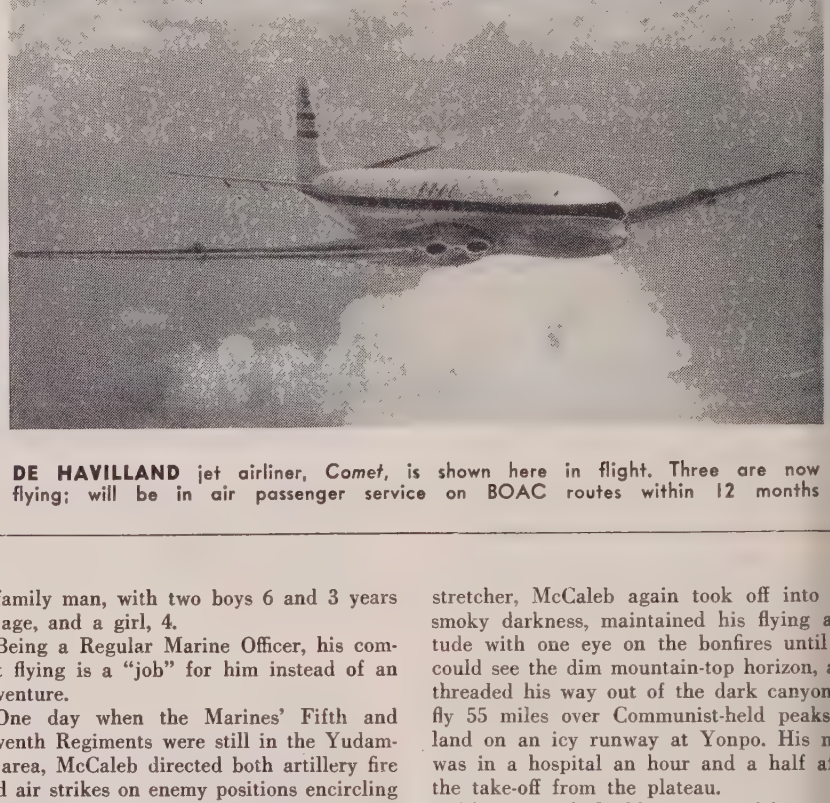
By this time VMO-6 at Yonpo had ceived Grumman TBM *Avenger* torp bombers, which the Marines called "T keys."

McCaleb, who had previously flown "T keys" off a carrier in between his *Cor* hops, tested one of the new arrivals, then flew it up to Koto-ri, hoping that eno of the airstrip was completed to effec careful landing.

There *was* a completed end—very sh narrow and rough. The approach had to made through a turbulent valley int mountain looming up on the far end of strip. To keep from running into the w ing and squealing bulldozers on the run the approach had to be very slow, McCaleb accomplished it.

He flew out several wounded, and on next trip, brought back Captain Malc (Monk) Moncrief of Prattville, Alabam help him with his landings. Moncrief w *Corsair* pilot from a Marine Fighter Sq

(*Continued on page 51*)



DE HAVILLAND jet airliner, *Comet*, is shown here in flight. Three are now flying; will be in air passenger service on BOAC routes within 12 months

Red Star Air Force

(*Continued from page 43*)

ough the Russian fighter elements may e re-equipped, the YAK-15's will probably e retained for use by the air forces of the tellite countries such as Poland, Czechoovakia, Hungary, Rumania.

In the tactical bombing sphere, the twint attack bomber, reportedly designated upolev TU-10, is now rapidly replacing ie piston-engined TU-2 of wartime vintage, id its modern lines can be seen in the lustration of this machine. Roughly comarable to Britain's English Electric *Canerra,* the TU-10 is now believed to be owered by two axial-flow M-O12H turbots developing 4,000 to 4500 pounds thrust ch and affording a maximum speed of 0 to 550 mph at sea level.

The circular section fuselage is indicative a pressurized fuselage and it may, therere, be that the TU-10 is amenable to high-titude bombing and target marking. The ean lines of the fuselage are marred by o excrescences: an offset bulge under the selage nose accommodating the backward-tracting nosewheel and a large bumper der the rear fuselage to act as a safeard against tail-down landings. A crew of ree of four is carried; the bombardier-vigator is positioned in the well-glazed se section, the pilot is seated ahead of e jet nacelles under a "semi-bubble" hood, d a tail gunner is positioned in the exme tail of the fuselage.

Spanning some 70 feet, the wing has a rfectly straight, non-tapered leading edge hereas all surfaces of the tail unit are arply swept back. It is possible that the ssians experienced some compressibility ubles with an orthodox empennage at upper limits of the bomber's performce scale. A rumored night-fighter version h a radar nose is unsubstantiated but, the light of special tank-busting versions high-altitude reconnaissance variants of machine's older stablemate, the TU-2, eems probable that it will be called upon fulfill the wide range of duties performed the piston-engined design.

In the jet-trainer sphere, Russia's first o-seater jet fighter-trainer, now widely d, is a variant of the YAK-15B single-t fighter. This aircraft follows Western ads in being a two-seat conversion of a ndard operational machine with a second kpit for the trainee placed ahead of the ginal cockpit. Both cockpits are enclosed a sectioned sliding hood. Armament is orted as two 12.7 Beresin machine guns. mera guns are fitted and rocket attachnt points have been noticed on some tographs. In all other respects, the plane similar to the latest fighter version and may foretell two-seat conversions of the G-15 and LA-17 fighters.

Undoubtedly, the Russian planes that we e described here will be in the forefront uld an open clash develop between East West. In the past we have tended to lerestimate the capabilities of Russian raft designers. We now have seen, how-r, the tenacity with which they are envoring to achieve technical parity. Let us e that these planes, or rather the knowle of them that we now possess, will prove old adage, "Forewarned is to be Foreed!"

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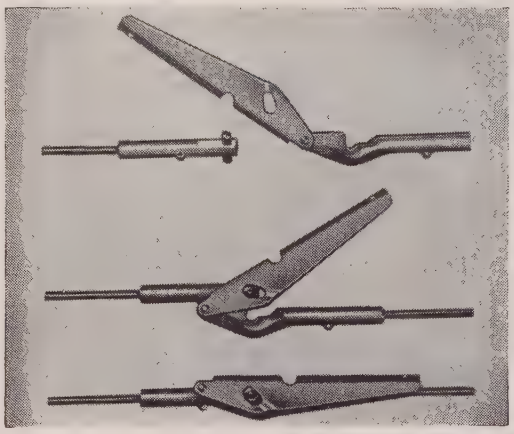
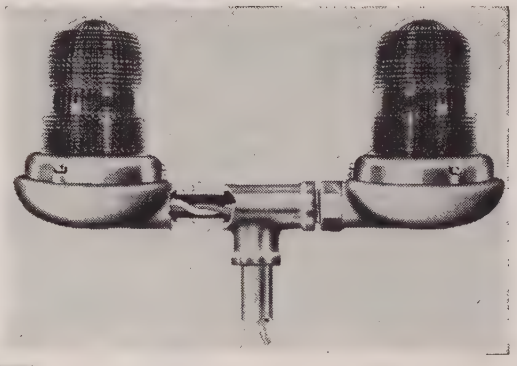
5-51

NEW AERO PRODUCTS

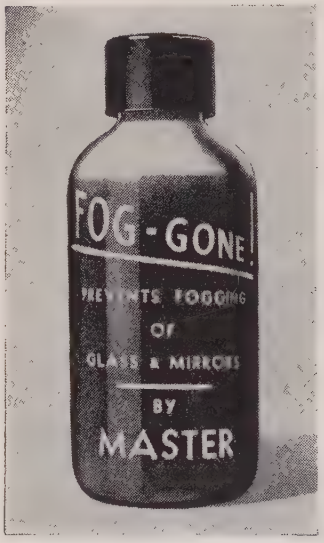


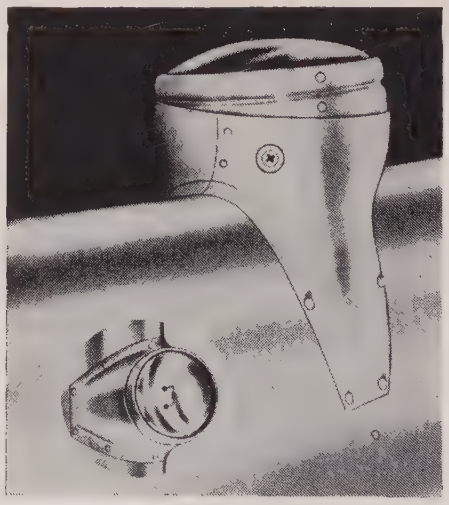
SPEED RIG is new cable disconnect. It eliminates safety-rewiring shank each time cable assembly is disconnected; developed by Pacific Scientific Co.

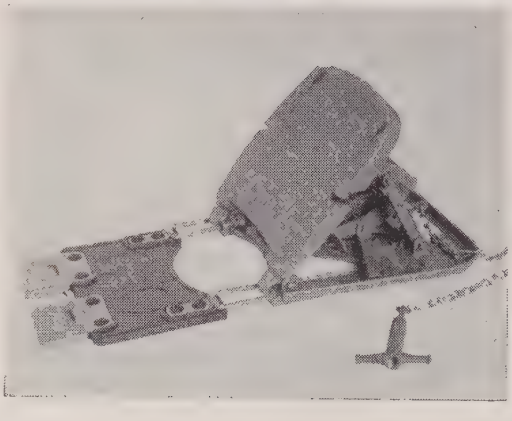
TELICO is new lightweight, heavy duty marker obstruction light made and marketed by Dave Rumph Co. Telico weighs less than four pounds; is waterproof, corrosion free



FOG-GONE is new product to prevent fogging of windshield. It contains new silicones; is packaged in four-ounce "squeeze-spray" plastic bottle. Spray on windshield, wipe with dry cloth. Made by Masters, Los Angeles 22, Calif.







WING-LITES are new all-purpose landing, taxi light for personal aircraft. Cost $37.50 per set. Aviation Accessories, Inc. Ft. Worth, Texas.

PYRENE is collapsible wheel chock for high-powered aircraft run-up; can withstand a thrust of 10,500 pounds. Pyrene Mfg. Co., Newark, N. J.

For Safety Sake

(Continued from page 33)

to crack the throttle only a little when starting the engine.

Once the motor is running, you must watch the oil and head temperature gages so that you won't begin to taxi with too cold an engine. Taxiing with a cold engine will do eventual harm to the inside of your plane's powerplant.

When you do begin to taxi out for take-off, move slowly. Make S turns if the nose of your plane is high enough to block forward visibility. Many planes have been completely wrecked on the ground by one propeller chewing its way through the wing and fuselage of another plane. You won't be likely to run into anything you can see; so make certain that you do see, and taxi slowly enough to stop safely if another plane does enter your path. The tendency toward fast taxiing seems to be greatest in the tricycle-geared planes. For some reason, speed on the ground seems less apparent in this type of plane. It is true that the wind will have less effect on a tricycle-geared plane on the ground. If your plane has conventional gear, be sure to keep the stick ahead when taxiing downwind, back when taxiing into the wind, and into the wind when taxiing crosswind. This procedure will keep the windward wing and the tail down, and this is extremely important when taxiing a lightplane in winds of more than 15 mph.

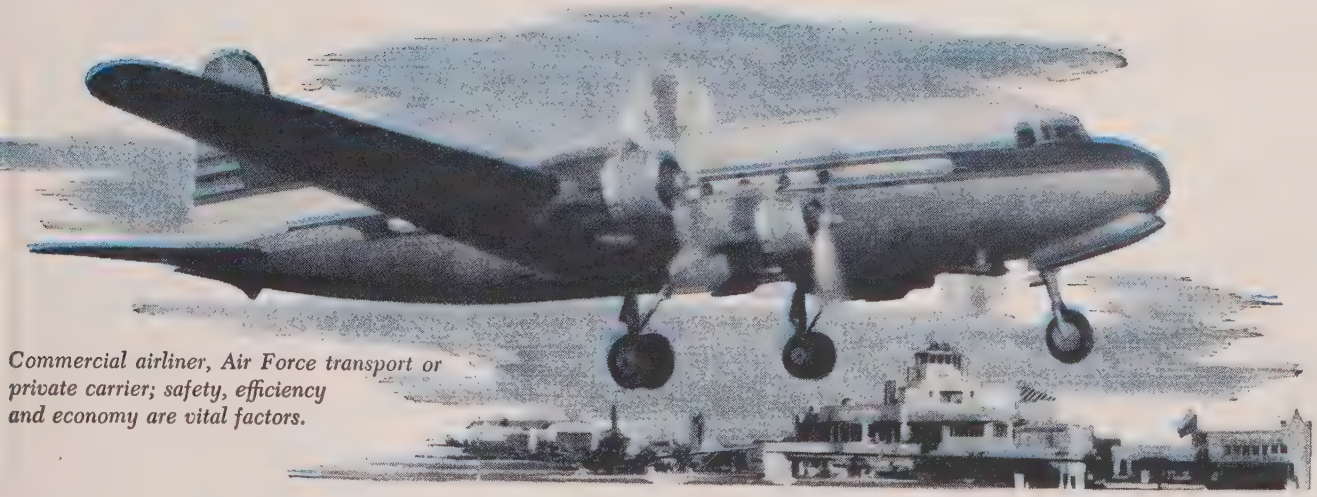
I shall never forget a doctor who decided some months ago to take off in his Taylorcraft, with the wind blowing 25 mph with strong gusts. He did take off, too, not in his plane, but on the train. The doctor made the mistake of holding the wheel back while taxiing downwind. A gust under the elevators whipped the Taylorcraft over on its back and completely demolished everything but the doctor. Correct use of aileron and rudder is most important when taxiing in high winds.

When you have taxied to the run-up position, make certain that the wing of your plane is not extending out over the runway in use. Park 45° from the wind and runway in use, and set your parking brake. If possible, run up your plane's engine on a paved surface; grass is the second choice. Pebbles will be picked up by your prop during run-up and this can cause nicks and necessitate prop finishing at an early date. Don't rev up the engine until head and oil temperature are normal. They usually will be, if you didn't start to taxi out until the engine was about 75 per cent warmed up.

Mags, control and flap travel, and carburetor heat are the most important check points during run-up. Check mags at high and low rpm; a miss will often show up at one power setting and not at another. If the drop is excessive on either mag, don't take off. A few years ago, a pilot ignored a dead mag and as a result he cracked up a twin-engine plane and killed nearly everyone on board.

Check ailerons, elevator, rudder, and flaps for correct and full travel. Imagine your embarrassment during take-off, if a mechanic hooked up your ailerons backward. It is also possible for some one to forget to remove control gust locks. This very oversight caused a fatal airline accident once. It could have

(Continued on page 52)



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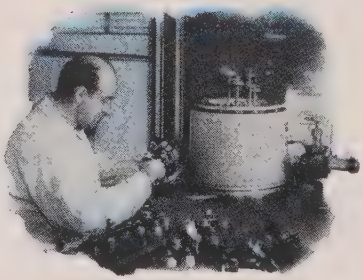

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And, of course, PAC is the first and largest distributor of Pratt & Whitney Engine parts in the world! Also, scores of other leading parts manufacturers are represented by Pacific Airmotive. PAC activity in the airframe overhaul field over a period of many years has resulted in facilities to handle aircraft from the smallest private ship to the large troop carriers. An example is the vast reconversion and modification program on F-51 fighters and C-54 military cargo carriers undertaken for the Air Force. PAC manufactured pressurization equipment is found as an integral part in 90% of all modern fighters and pressurized commercial transport craft.

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Panel for Your Plane

(*Continued from page 27*)

or inferior instrumentation, which reduced the utility of the airplane, was responsible for considerable owner dissatisfaction and short-time ownerships. Cheap, inaccurate instruments were another source of dissatisfaction. More than one pilot, forced to come down through a layer of smog, smoke, or low stratus that made visibility poor, while at the same time depending on an altimeter that was accurate only to the nearest 100 feet, experienced a psychological reaction that caused him to dispose of his airplane soon after.

In addition, the survey revealed that among those pilots who responded, 95 per cent wanted better compasses; 82 per cent wanted more sensitive altimeters; 81 per cent, turn-and-bank indicators; and 63 per cent, climb indicators. Accumulated from a cross-section of the country's most able lightplane pilots and owners, these figures indicated general dissatisfaction with conventional lightplane instrumentation.

In general, airplanes purchased for utility will be used more often in cross-country flying than will pleasure craft. In this respect, the Kollsman survey indicated that instrumentation usually was in proportion to the amount of cross-country work for which the airplane was used. Lightplane manufacturers stressing the utility angle will do well to keep this pertinent fact in mind. Modification of contact flying regulations is another factor that should be kept in mind. These modifications do not provide for greater safety—only better instrumentation will do that.

When an airplane is purchased for utility, the locality in which it will be used and the purpose for which it was purchased will often indicate the extent of the instrumentation necessary. Clear, dry climates provide a greater number of contact flying days than are found in coastal regions where fog, mist, and sudden squalls are common. This means that with the same instrumentation, an Arizona rancher will be able to use his airplane more days than a Los Angeles commuter or a Puget Sound fish spotter.

Roughly, the utility afforded a lightplane by proper flight instrumentation will increase almost directly as the cost of the instruments. The percentage cost of instrumentation, based on the total cost of the equipped airplane, will drop with the increased cost of the airplane. But this last figure should not be misleading. It is often just as important and profitable to keep a $3,000 airplane in the air as it is a $10,000 job. Manufacturers stressing the utility angle should take this fact into consideration.

This does not imply that the average lightplane should be instrumented like an airliner. Blind-flying instruments are required in only a few isolated instances. The real value in better instrumentation lies in making it possible to operate on those sub-marginal contact flying days when otherwise it would be safer to stay on the ground. If the airplane is being used by the pilot to earn his living or further his business, a few such "extra" days will soon amortize the instrument costs.

Here again we run into controversy. Just what "extra" instruments are required—instruments over and above the conventional set-up? We've already pointed out that locality and airplane-use are controlling factors. This makes it necessary to generalize for average conditions, then deviate when necessary. The following four flight instruments are recommended by an expert:

(1) A compass-controlled (or "slaved") directional gyro.
(2) An accurate airspeed indicator.
(3) An accurate altimeter (semi-sensitive).
(4) A highly graphic-type attitude indicator.

Semi-sensitive altimeters are now available at a reasonable cost. These instruments are calibrated so the pointer makes one revolution for every 3,000 feet, with the dial marked off in 50-foot intervals. A few are even more sensitive than this, yet do not approach the 10-foot intervals found on most sensitive instruments. Graphic-type attitude indicators are available that are so simple to use that after one hour's instruction, the average pilot can execute loops and slow rolls under a hood. A "slaved" gyro is not cheap, but is a mighty handy instrument when needed. On soupy days, the best cross-country time calculations are bound to go wrong when used in conjunction with a faulty airspeed indicator.

In considering instrumentation, lightplanes may be logically placed in three classifications. First, there is the basic lightplane as delivered by most manufacturers and containing conventional instrumentation. These planes are used mostly for training and building up solo time in what might be termed "airport" flying. They are generally equipped with an ordinary compass, altimeter and airspeed indicator. Extensive cross-country flying or flying during inclement weather are seldom practiced except by the foolhardy.

The second classification is the basic utility airplane. This plane may operate in a radius of from 200 to 300 miles from the airport, and may serve any one of a dozen uses. For maximum utility under questionable weather conditions, such planes should contain in addition to a compass and airspeed indicator, a semi-sensitive altimeter and a directional gyro. When based on a large commercial field, a two-way radio with a direction finder for homing often may be used in a tight spot.

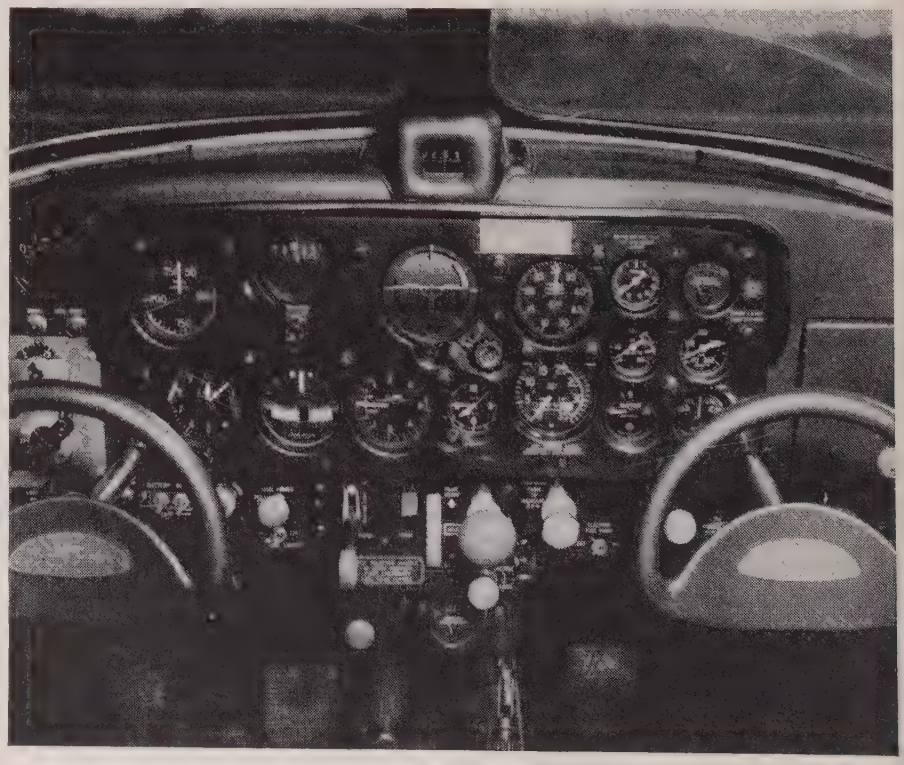
This classification contains most airplanes where special types of instrumentation depend upon the use. It is quite obvious that an airplane employed for local aerial photography would not require special instrumentation as pictures can be made only on clear days. On the other hand, a fish spotter operating off shore is always in danger of sudden squalls or quick fogs.

The third classification includes airplanes used extensively in cross-country flying and in work that brooks no avoidable delays. Executive airplanes, aerial taxis and ambulance airplanes are examples. In addition to the instruments mentioned above, such planes should be equipped with "slaved" directional gyros and an automatic pilot. On long flights, the auto-pilot offers considerable fatigue relief and permits the pilot to retain a sharp wit at all times.

When and where is this extra instrumentation going to be installed? Will it be done by the manufacturer, or by the owner after he has purchased the airplane? This question has been posed many times. The Kollsman survey indicated that 51 per cent of the pilots thought that advanced instrumentation should be standard equipment; 46 per cent wanted it as optional equipment, and 3 per cent wanted to purchase the instruments when and if they were required.

This would indicate that the manufacturer should install the instruments as required at

INSTRUMENT PANEL in the military version of the Ryan *Navion* looks like this. Called the Military-version Gyro Instrument panel, it represents an investment of some $555.50



the time the airplane is sold. But as most airplanes are in the hands of a distributor at the time of the sale, and as most distributors have only limited installation facilities, considerable time might be required before the airplane could be delivered.

With cross-country flying taken as the basic maneuver requiring advanced instrumentation, the Kollsman survey revealed interesting data. Services engaged mostly in flight instruction, both basic and advanced, indicated that only 22 per cent of total air time was in cross-country flying. This means that only one out of each five airplanes operated would have to be equipped with advance instrumentation. From the standpoint of individuals, airplanes used for pleasure only averaged 29 per cent of total flight time in cross-country flying; those used for both business and pleasure average 50 per cent; while those used for business only averaged 60 per cent of total time in cross-country trips. Usage for cross-country trips averaged from 28 per cent of total flight time on airplanes powered with a 65-hp engine to 91 per cent of total time on airplanes powered by engines above 275 hp.

These figures, at least, furnish data for a more thorough survey of the problem. It is entirely possible that such a survey would indicate that manufacturers standardize on three instrument groups, and that these groups be installed at the factory. With such a choice before him, the purchaser would seldom be faced with the necessity of modification. The larger distributors could stock planes with all three types of instrumentation, while smaller distributors could sell on the "fly away" basis, or could order a correctly instrumented plane directly from the factory and get it in less time than would be required for instrument installation by the dealer or instrument service operator.

Flying school operators are prone to regard advanced instrumentation as an additional load and cost in student training. They claim it would prolong initial flight training by several hours. But at the same time more and more students are learning to fly for strictly utilitarian reasons and are willing to pay for this additional training. Pleasure pilots are becoming a minority and must be considered as such. The net result of this change-over can only be constructive. When a man is using an airplane to help make his living, ownership dissatisfaction will be less common if his plane is equipped for marginal weather flying and if he is trained to fly that kind of weather. More people will retain the airplane as a mode of transportation.

Installing proper instrumentation is a complicated problem, but a problem that must be solved. The lightplane industry could not have continued to exist by producing clear-weather pleasure craft only. Utility is now the byword. From both the pilot's and the manufacturer's standpoint, increasing this utility in line with reasonable costs is of paramount importance.

"Heck of it is," old Hank interrupted my reverie, "it'll take me at least six weeks to get a plane instrumented the way Johnny needs it."

"Too bad," I answered. "Now if he just had your experience, he could get along without those instruments for a few weeks."

"I'll just keep my experience," old Hank said. "It comes in handy when I want to sit down."

Wild Guy in an OY

(*Continued from page 46*)

ron, and was qualified as a landing signal officer.

Lanky and blond-haired Moncrief's rebel accent was even thicker than McCaleb's.

From the gun turret of the TBM he looked down on the embattled scene and said to McCaleb, "What y'all doing to me, boy? That ain't safe sawin' there. If you want me to wave m' paddles, let me do it on a carrier!"

McCaleb carefully explained. "Now Monk, this strip is short and rough, as you can plainly see, and I don't want to crack this here plane up, particularly me. Now, if you get on those paddles and help me come in through that valley like I was comin' aboard a carrier, maybe I can stop without clobberin' up those valuable 'dozers."

The carrier-landing technique worked fine, and McCaleb flew out several wounded men that afternoon.

The next day with Moncrief again on the paddles, McCaleb flew 11 trips between the partially built strip and Yonpo, 35 miles away, where the evacuees were loaded on ambulances. During this day, he carried out 76 wounded Marines and soldiers.

Each trip he loaded from five to seven evacuees into his plane, until one landing when Moncrief said, "Hurry, boy! It's cold up here, and some good-for-nothing up on that hill is shootin' at me. He doesn't like m' paddles."

McCaleb sat in the TBM all day without even getting out of his cockpit to eat the sandwich they gave him at Yonpo. On one trip he took off with his TBM straining and groaning with 10 wounded Marines aboard, a tremendous load for the single-engine carrier plane. His take-offs were all carrier take-offs: full flaps, full RPM, and full throttle before starting to roll.

So far Capt. McCaleb has been awarded three DFC's and two Air Medals for his exploits in Korea. Despite his dangerous flying he hasn't been hit once by enemy fire, although several other pilots have been killed on similar missions.

"However, in one of those OY's you can always tell when they're shootin' at you. You can hear them. Sometimes it gets so it bothers you. A good idea is to put cotton in yer ears and then dodge, and slip, and skid like all get-out," he reported.

Later in December, after his big evacuation merry-go-round with the Turkey, Mac was ordered to Japan for reassignment. He had flown 136 combat missions but he was still eager to fly. While his buddies were relaxing from their war strain in a big blow-off at Kyoto, the captain volunteered to make a one-day emergency flight up to Tokyo and back—in a TBM. It was a long, slow, tedious ride, especially tiring on the seat bones. And without the prospects of a soiree into Tokyo either.

He just likes to fly.

What does he want to do now? A nice instructor's job at Pensacola or Corpus Christi? A staff job at the Marine Corps Air Station at El Toro, California, maybe?

"Heck, no," the soft-spoken man from Dixie said. "I couldn't be happy in a little ole desk job. I want to get into a jet squadron—and soon, too. I'm tired of this sittin' around."

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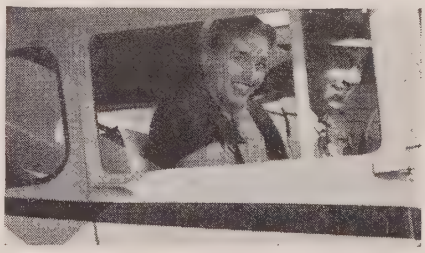

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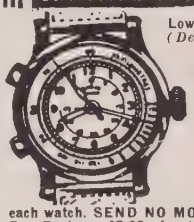

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For Safety Sake

(*Continued from page 48*)

been avoided by an SOP control check.

Carburetor heat is important at all times and especially during cold or damp weather. Some engines can be ice free at the beginning of the take-off run and iced up by the time an altitude of 300 feet is reached; the Jacobs engines in a C-78 often ice this quickly under certain conditions. Check carburetor heat at about 1500 rpm; you should get a drop in power when the heat is pulled on; then turn off the heat and take off safely with the knowledge that you'll have heat if and when you need it.

Before you taxi out onto the runway for take-off, make certain there is no plane making a landing approach. The landing plane usually has the right of way. If your airport is tower-controlled, get a radio clearance or a green light before you take the runway. Once you do line up for take-off, don't waste too much time parked with your back toward incoming traffic. I have seen a low-wing plane land on top of a high-wing one . . . it made a sorry mess. The visibility was poor below in the landing plane and poor above in the one on the ground.

If the airport is busy, don't take off too close behind another plane, especially if it's a big one. I can recall one take-off I made in an Army B-24; it was early morning at Kano in the heart of Africa. The wind was calm and the tower cleared me off behind a four-motored British bomber. As the British plane cleared the far side of the field, I applied power to the four 1200-hp P&W's. My heavily loaded B-24 broke ground slowly in the calm of early dawn. I called for gear up and my co-pilot, Joe Barber from Rhode Island, hardly had time to reach for the gear lever when I yelled for him to help me on the controls. Our staggering B-24 started what felt like a slow roll about 10 feet off the runway. It took all our combined strength to right the plane but *we* weren't right until we reached 10,000 feet over the African jungles. What had happened? We had hit the prop wash of that British bomber. If a prop wash could do that to our 65,000 pound B-24, think what it would have done to a lightplane. To avoid prop wash, don't follow another plane too closely on take-off; watch for trouble in dead calm or when the wind is straight down the runway. If the wind is slightly cross, the wash will usually drift away from your take-off path.

During take-off, make a normal climb out and don't try to grandstand to your friends or best girl. A friend of mine used to hold his PT-19 down along the runway and then chandelle out at the far end of the field. He doesn't do it any more—the engine quit once, right at the beginning of a pull-up.

Watch other planes taxiing back for take-off along the runway in use. If there are several planes, try to use the far side of the runway for your take-off. Remember that the average lightplane wing sticks out about 15 feet past your seat in the cockpit; the guy who is taxiing back has 15 feet of wing poking out toward you. That makes 30 feet necessary for a minimum clearance, and at your take-off speed there should be lots more than that 30 feet for safety. Take off from the far side of the runway, fix the nose of your plane on a point at the far end of the runway and take off straight by really keeping ahead of the rudder. Your plane will try to turn into the wind if it's a little cross, so tramp on that opposite rudder pedal with your flying boots.

One type of accident that is usually fatal is collision in the air. The way to avoid a collision around the airport pattern is by maintaining the prescribed altitude around the field. If you are supposed to be at 600 feet on the downwind leg, be at 600 and not 100 feet higher or lower. Keep in mind that all planes in the pattern are going to let down for a landing. If the plane ahead of you is at your own altitude, you'll see him. But if he's above or below you—look out! A low wing on your plane can put a plane below you in a blind spot and you could let down on top of him. If the plane ahead of you is slower than you are, fly a larger pattern so you won't catch up to him before he clears the runway after landing.

The base leg of the flight pattern is the last place for a safety check and look-around; many novice pilots look only inside their pattern or toward the field. Don't! Look *outside* the pattern on the base leg and be sure that no one is making a long straight-in approach from the next county. If there is a plane coming, it is best to circle again even though he is in the wrong and you feel you have the right of way. There is no right of way in the cemetery.

Not too long ago, I was riding with a student who was practicing landings in a *Cub*. On the base leg of our approach he was intent on watching the runway and failed to see a Piper *Super Cruiser* making a long straight-in approach from way, way back. I thought that we could land and clear the runway before the *Cruiser* touched down so I told the student to land long (far up the runway). This should have allowed plenty of room for the *Cruiser* to land behind us, but I didn't figure on the pursuit-ship approach the *Cruiser* was making. We touched the ground with about 1500 feet of the runway behind us, but when I looked out behind and under the wing, there was the *Cruiser* bearing down on us like a Russian Tank. I gunned the J-3 and the *Cruiser* pilot groundlooped at the same time, but his wing tip nicked our rudder. Fortunately, the damage was slight, but not to my temper. He had followed us in too close, he had landed long and hot instead of circling again. Either of us could have avoided what might have been a nasty accident; luckily it turned out to be only a minor scrape.

During a landing approach, put carburetor heat on and keep the throttle cracked slightly until you clear the edge of the runway. Many accidents have occurred because a lightplane pilot made a too short approach only to find that he had no power when he needed it. Keep the motor cleared out, too, by gently opening and closing the throttle during your approach. Don't be ashamed to go around again if a plane is in your way while you are making a landing approach. Leave the formation landings to the military pilots who are trained to make them.

Don't try to see how short you can land, especially if planes are parked waiting to take off. And don't try to see how quickly you can turn off the runway. Also, remember that a landing isn't over until your plane rolls to a complete stop. Then clear the runway as quickly as possible.

When you return to the parking line or hangar again, taxi slowly. When parking, don't spin your plane around in a fast pivot while close to other planes, buildings or flagpoles. I have seen plenty of old-timers—and hot rocks, too—slam a wing tip into a hangar or flagpole. Get rid of your excess energy in a gymnasium and not at the airport. When parking a plane, try to get some one to watch your wing tips and guide you into any close parking spots.

I hope that these hints will help to make safer your future air trips.

WING TIP

Pilot-owners and operators will find this easily made tow bar a real time- and effort-saver when moving *Ercoupes* in or out of the hangar or out on the parking apron. Any mechanic can make one like this in a few hours. It was built of one-inch aircraft tubing and is four-and-a-half feet long; the handle is 12 inches long. The axle end is of three-quarter-inch tubing, is three inches long and is designed to hook into the nosewheel hollow axle. The handle and axle hook are welded to the main stem which is bent to clear the tire but put the force on the centerline of the wheel where it is most effective. *B. Blatt*

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5-51

Contract Flight Training

(*Continued from page 29*)

The trend to use civilian schools in the Air Force expansion program thus seems to be firmly established. A lot of air has flowed over the wings since May 1939, when the late General of the Army Henry H. (Hap) Arnold (then Major General) made a courageous and precedent-shattering decision. He called in the heads of a few civilian flying schools and told them to get ready in less than six weeks to train huge classes in Primary Flight. First it was to be 2400 pilots a year, then from 12,000 to 30,000 a year. The peak rate was actually over 100,000 per year. How well the civilian schools did it is now history. The group included several World War I combat pilots such as Major C. C. Moseley of Glendale; Captain Max Balfour of Tulsa; Oliver L. Parks, East St. Louis; W. F. Long, Dallas; H. S. Darr, Chicago and Claude Ryan of San Diego. Two top non-military flyers who took part were Allan Hancock and E. S. Sias. The majority of these men became the nucleus of the Aeronautical Training Society (ATS), whose members carried out the flight-training program for the AAF and various other types of training for United Nations cadets during World War II.

The United States is again facing an emergency situation and the flight school members of the Aeronautical Training Society report that they have a civilian potential for training more than 9,000 flight cadets for the Air Force without expanding present facilities.

Actually this training could go well beyond the 130 hours of Primary-Basic into the advanced stages of fighter-aircraft training. A good example of how this would be done is the group of 22 Royal Pakistan Air Force cadets which was trained at the Hawthorne Flying Service school in Jacksonville during 1949. President "Bevo" Howard states that they did an excellent job of flying. They received an average of 250 hours of flying; 30 hours in PT-17's, 160 hours in T-6 advanced trainers, and 60 hours in F-51 *Mustangs* without a single fatality.

The RPAF cadets also received Link training, instrument flight, night flying, low-level cross-country flying, formation flying, camera gunnery and high-altitude flight using oxygen equipment. The daily utilization of F-51's occasionally ran as high as seven and a quarter hours, with normal use averaging about four hours and 20 minutes per day. A total of 1300 hours was put in on fighter aircraft. This was the first time that fighter training had been given in fighter aircraft by a civilian contractor and by the contract method.

Air Force plans are now set to train more than 2,000 basic-flight cadets in civilian contract schools in the current year. In addition to this, over $8 million has been approved for training over 10,000 A & E mechanics in civilian aviation technical schools by the end of fiscal 1951.

Contracts with five schools have been awarded as a start. Classes began in February, and will continue for 15 weeks with 30 new students entering each week until a total of 450 is reached. Here are the schools selected: Cal-Aero Technical Institute, Glendale, California; USC College of Aeronautics, Santa Maria, California; Dallas Aviation School, Dallas, Texas; Embry-Riddle International School of Aviation, Miami, Florida; Spartan School of Aviation, Tulsa, Oklahoma; and Parks College of Aeronautical Technology, East Saint Louis.

This AF expansion into the civilian technical training schools follows the pattern of World War II and has become necessary because the AF's own facilities are overloaded. At the beginning of fiscal 1951 (a few days after the outbreak of hostilities in Korea) the technical training program called for a capacity of 25,000 technicians. By the end of the calendar year this had increased to about 35,000, and by the end of June 30 the figure will be better than a 50,000 capacity for technical training.

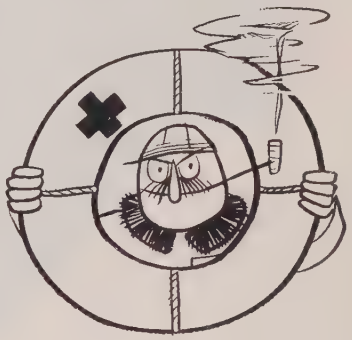
All this certainly indicates that in this group of civilian flying and technical schools our country has an asset of incalculable value. It works to the advantage of the Air Force, the U. S. taxpayer and the free world as a whole in this latest and grimmest struggle against tyranny.

Jet Armament

The tremendous power which can be packed by a jet fighter in ground support or tactical air warfare is described by Col. Wm. Gross, TAC: "Standard jet fighters used by AF for close tactical support are now able to deliver as much as 1,000 pounds of bombs plus eight 5-inch rockets and six 50-cal. machine guns . . . . or as many as 32 HVAR rockets. Carrying all rockets, one aircraft exceeds the potential destructive power of one salvo from eight four-gun batteries of 105-mm guns."

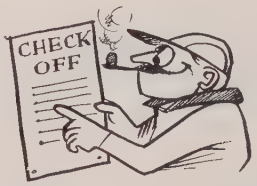
Courtesy "Planes"

SETH'S SAFETY QUIZ



1. If, while over a station, you receive and place the current "altimeter setting" on the pressure scale of your altimeter, what altitude will it then show?
2. If, while flying according to VFR, you encounter weather below that required by regs, what would you do if *not* currently qualified to proceed on instruments?
3. In the event of fire any place in the airplane during flight, should the windows in the pilot's cockpit of multi-engine planes be opened to keep cockpit clear of smoke?

ANSWERS



1. It will show your altitude (uncorrected for temperature above sea level).
2. Either alter course so that minimum weather for VFR will be met, turn back, or land. Turning back does not entitle you to violate visibility requirements. If weather gets below minimum, you must land at nearest airport or emergency field.
3. No. Windows should be left shut. If windows are opened, smoke and flames may be sucked *into* the cockpit.

PICTURE CREDITS

Pages 4, 5—Packard, USAF, SBAC; 6—Piper, Douglas; 8, 9—Wide World, Acme; 10, 11, 12—USAF, Acme, Northrop, North American, Lockheed, Boeing; 13—Levy-Shipp; 14, 15—Lockheed; 16, 17—Cessna, Ryan; 18, 19—Wm. Green; 20, 21, 22—Downie; 23—Hobart; 24—USMC; 26, 27—Ryan, Piper; 30, 31—Consolidated Vultee, Douglas, Bell, Acme; 32, 33—Downie, Martin and Kellman; 36—Shell; 37—USMC; 38—Northrop; 40—Lockheed; 42—Northrop; 44—Percival; 45—Levy; 46—De Havilland; 50—Ryan; 56—Wide World, Acme; 61—CAA; 62—Lear; 63—Fairchild; 64—NARCO, Van Dusen.

Job Opportunities in Aviation

P & W Hires Its 20,000th Worker

Represents gain of 5,000 workers during past 12 months

Pratt and Whitney Aircraft recently hired its 20,000th worker, William P. Gwinn, general manager, announced. This represents a gain of over 5,000 workers during the past 12 months, with about 2500 new workers hired during the past three months (December, January and February).

Pratt and Whitney Aircraft will need approximately 11,000 more workers by 1952 to meet its rapidly expanding defense production program. This is an upward revision of an earlier P & W estimate when future requirements were set at an increase of 10,000 over the 17,500 persons then employed. During World War II peak employment in the Pratt and Whitney Connecticut plants was 39,000 of which 27,000 were in East Hartford, Connecticut.

A satellite plant in Southington, Connecticut, has been turning out engine parts, and 4,000 eventually will be employed there. At the present time, P & W is drawing employees from 130 of 169 towns in Connecticut.

About one out of every three workers being taken on by P & W is a woman.

For Pratt and Whitney employment opportunities, write to: Mr. T. R. Downs, Pratt and Whitney, 400 Main Street, East Hartford, Connecticut.

Fairchild Building A New Missile Plant in New York

Fairchild Engine and Airplane Corporation is building a new guided missile plant on a recently acquired 32-acre site at Wyandanch, Long Island, New York. Construction of the first unit began in March, and it is scheduled to be in full operation by September 1.

The new factory is being constructed to fit the special requirements of missile and guided missile system development, and will include as part of the basic structure shielded laboratories designed to be completely free of electronic interference. The units and certain other areas of the plant are to be air conditioned. The building is being constructed so as to permit ready expansion should more facilities be required.

It is expected that the new Fairchild plant will open up many employment possibilities for workers in the New York State area.

For information regarding work with Fairchild, write: Mr. S. A. Angotti, Fairchild Engine and Airplane Corporation, Hagerstown, Maryland.

Bell Aircraft Secures Former Globe Factory

Bell Aircraft Corporation has secured possession of the major part of the former Globe Aircraft facilities at Fort Worth, Texas. Bell will use these facilities as a jet engine nacelle build-up shop for the B-36 and B-47 bombers,

(*Continued on page 56*)

U. S. Aircraft Industry

Company	Location	Plant Area Sq. Ft.	Plant Employment	1950 Sales[1]	Backlog[1]
Aeroproducts Div.—GM	Vandalia, Ohio	201,600	1,528	NA	NA
Allison Div.—GM	Indianapolis, Ind.	4,000,000	10,000	NA	NA
Beech Aircraft Corp.	Wichita, Kan.	1,250,000	5,000	$21,000,000	$50,000,000[2]
Bell Aircraft Corp.	Buffalo, N. Y.	1,880,000	7,882	40,000,000	150,000,000[6]
Boeing Airplane Co.	Seattle-Renton, Wash.	1,881,365	24,400	207,606,569	NA
Cessna Aircraft Co.	Wichita, Kan.	2,175,790	18,180		
	Wichita, Kan.	542,000	2,200	7,158,499	40,000,000
	Hutchinson, Kan.	113,251[1]	200		
Chase Aircraft Co.	Prospect, Kan.	160,000	200		
Consolidated Vultee Aircraft Corp.	West Trenton, N. J	200,000	1,200	NA	NA
	San Diego, Calif.	3,000,000[1]	16,000	250,000,000[3]	250,000,000
Curtiss-Wright Corp.	Ft. Worth Texas	4,0000,000	26,000		
	Caldwell, N. J.	800,000	4,500[1]	150,000,000	300,000,000
Douglas Aircraft Co.	Wood-Ridge, N. J.	2,827,550[5]	10,000[1]		
	Santa Monica, Calif.	941,404	10,200	100,000,000[4]	625,000,000[4]
	El Segundo, Calif.	594,532	7,700		
Fairchild E & A Corp.	Long Beach, Calif.	788,486	9,800		
	Hagerstown, Md.	900,000	5,000	NA	NA
General Electric Co. (Aircraft Gas Turbine Div.)	Long Island, N. Y.	600,000	2,000		
	West Lynn, Mass.	737,000	5,870		
	Everett, Mass.	239,000			
Grumman Aircraft Engineering Corp.	Lockland, Ohio	4,000,000[8]	10,000[8]		
	Bethpage, N. Y.	1,523,685	6800	NA	NA
Hiller Helicopters, Inc.	Palo Alto, Calif.	61,500	300	NA	4,000,000[6]
Kaman Aircraft Corp.	Windsor Locks, Conn.	22,800[1]	165	NA	2,000,000[6]
Lockheed Aircraft Corp.	Burbank, Calif.	NA	NA	170,000,000	425,000,000
Glenn L. Martin Co.	Middle River, Md.	2,400,000	11,500	40,500,000	175,000,000[6]
McDonnell Aircraft Corp.	St. Louis, Mo.	1,590,711	7,000[2]	38,688,383[11]	180,000,000
North American Aviation Inc.	Los Angeles, Calif.	2,915,841	13,795	143,032,357[7]	311,270,388[6]
	Long Beach, Calif.	500,223	1,927		
	Downey, Calif.	974,676	4,770		
	Torrance, Calif.	149,721	322		
	Columbus, Ohio	1,408,693	2,421		
Northrop Aircraft, Inc.	Hawthorne, Calif.	1,461,490	9,000[1]	52,224,513	180,000,000
Piasecki Helicopter Corp.	Morton, Pa.	250,000	1,650	8,000,000	90,000,000
Republic Aviation, Inc.	Farmingdale, N. Y.	1,650,000	7,700[6]	43,021,000[4]	270,000,000[4]
Ryan Aeronautical Co.	San Diego, Calif.	640,000	3,000	12,500,000	25,000,000[6]
United Aircraft Corp.	East Hartford, Conn.	2,847,000[1]	20,000	192,268,229[4]	700,000,000[4]
	Southington, Conn. (Pratt & Witney)	500,000	4,000[10]		
	East Hartford, Conn. (Hamilton Std. Div.)	500,000[1]	(9)		
	Dallas, Texas (Chance Vought)	1,800,000[1]	(9)		
	Bridgeport, Conn. (Sikorsky Div.)	325,730[1]	(9)		
TOTALS		49,354,084[1]	306,210[1]	1,475,999,550	3,777, 270,388

* Prime engine and airframe contractors for the services with exception of Westinghouse Electric Corp. which did not furnish data before closing date.
[1] Aviation Week estimate.
[2] Estimated as of Jan. 1, 1950.
[3] Fiscal year ending Nov. 30, 1950.
[4] Nine months to Sept. 30, 1950.
[5] 527,553 sq. ft. of total for N. J. Woolen Mill purchased Jan. 31, 1951.
[6] As of Dec. 31, 1950.
[7] Fiscal year ending Sept. 30, 1950.
[8] Estimated when expansion completed.
[9] Included in UAC total employment of 34,000.
[10] Planned employment under future operations.
[11] Fiscal year ending June 30, 1950.

Source: Manufacturers' reports and Aviation Week estimates.

CHART prepared by Aviation Week gives complete picture of U.S. Aircraft Industry

and expects to augment this program as soon as more space is available in that area.

Bell has been hiring in Fort Worth, but for the most part employment has been of a maintenance, plant protection and clerical nature. Just as soon as the Globe facilities are ready for operation, employment is expected to quickly build up to over 500 employees. At the present time, a small group of production men are taking on-the-job training at Consolidatd Vultee's Fort Worth plant where the Bell-built nacelles are installed on B-36 bombers.

Gears To Up Production

In keeping with present defense demands, the American Extruded Products Company is gearing its Los Angeles plant for increased production of vinyl resin compounding and extruding to meet all government specifications for the Air Force, Naval Ordnance and Chemical Warfare.

For employment opportunities with American Extruded Products Company, write to that compnay at 1023 North Le Brea Avenue, Los Angeles 38, California.

North American Opens Engineer Class

Young engineering graduates and non-aviation engineers can "earn while they learn" in North American Aviation's aircraft engineering school which has been planned to help meet the current demand for engineers. The school is located in Inglewood, California, near the company's main plant in Los Angeles, and it will handle about 70 students every three weeks. Engineers will receive instruction and indoctrination in all phases of general aircraft engineering.

North American's present engineering staff numbers over 4500, with more engineers required for work on military jet aircraft and in the company's guided missile programs.

For information regarding employment at North American Aviation, write: Mr. D. R. Zook, Employment Director, North American Aviation, Los Angeles Airport, Los Angeles 45, California.

Aeroquip Buys Metalco; To Move To Cheboygan, Mich.

The Aeroquip Corporation, of Jackson, Michigan, has purchased all the outstanding stock of Metalco, Inc., also of Jackson. Metalco has been a substantial subcontractor of Aeroquip, furnishing a variety of special hose fittings, tube bends, and elbows used in Aeroquip hose assemblies. The company has been operating in a plant which now appears inadequate to handle the increased production requirements, and so arrangements have been made for the lease of a larger plant in Cheboygan. This plant will more than triple the floor space of Metalco, and allow a sizeable expansion of its operations.

The company, it has been said, expects to add to its payroll from the Michigan area.

JET LIGHTS are on again at North American Aviation. Here, ramp crews work into night to meet stepped-up demands for the F-86 *Sabre* jet fighter, front-liner in Korea

Lockheed Signs Contract With Rheem Mfg. Company

Rheem Manufacturing Company has signed a contract with Lockheed Aircraft for the fabrication and assembly of major components of the Lockheed T-33 jet trainer and F-94 all-weather jet fighter. Work on the contract will start immediately at the Rheem plant in South Gate, and will ultimately utilize about half of the new building for aircraft facilities that is presently under construction on a 50-acre site in Downey, California.

This contract will extend well into 1953, and will require over 1800 additional workers at the new Downey plant alone. For detailed information regarding employment possibilities, write: Rheem Manufacturing Company, Aircraft Division, 4361 Firestone Boulevard, South Gate, California.

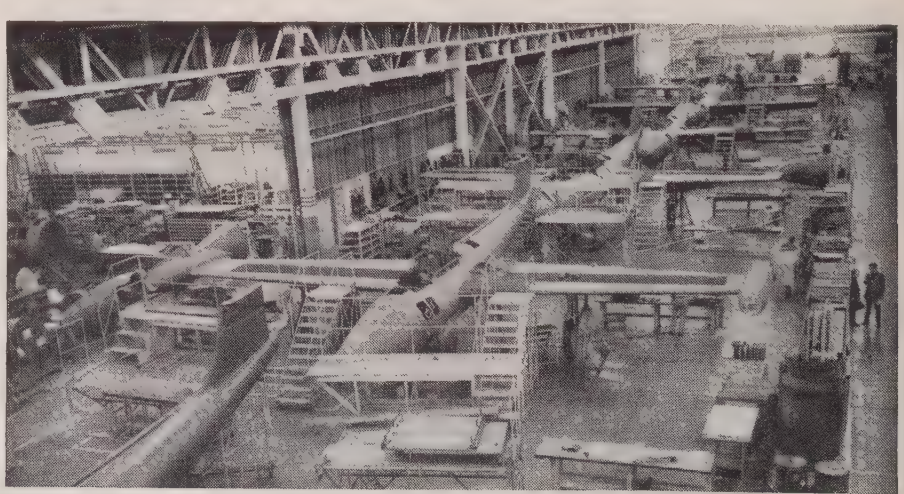
Seeger to Build Tanks

A $4,000,000 contract for production of super-streamlined combat fuel tanks for F-86 *Sabre* jet fighters has been awarded to the Seeger Refrigerator Company, of Saint Paul, Minnesota. Tanks to be produced by the Seeger Company will be used on three versions of the F-86: the F-86A now in operation in Korea, the F-86D jet interceptor, and the F-86E "super-controlled" jet fighter.

Allison Gets AF Contract for J-35-A-23

The USAF has announced the award of a production contract for a newly developed Allison turbojet engine with a thrust rating substantially higher than any jet engine heretofore produced. Identified as the J-35-A-23, the engine will be built at Chevrolet Motor's plant at Tonawanda, New York, and in other cities. The Allison portion of the contract will be built at Indianapolis, Indiana, where production facilities are currently being set up.

For possible employment opportunities with Allison, write: Mr. K. H. Hoffman, Allison Division, GMC, Indianapolis 6, Indiana. Mr. Hoffman may also direct applicants who are interested in employment possibilities at the Chevrolet plants.



AIR FORCE F-89's are rolling off lines at Northrop. F-89 is all-weather jet fighter

Hangar Flying

(*Continued from page 6*)

th the Canadian Department of Transport. ie Department of Transport transmits the ght plan to the CAA communications sta- n nearest the airport of entry. The CAA en notifies the U. S. Customs Service as the expected arrival, and Customs, in turn, tifies the U. S. Immigration and Naturaliz- on Services and other agencies concerned. Beyond filing a normal VFR or IFR flight an, the only requirement for the pilot will to include the number of aliens and the mber of U. S. citizens aboard, and a re- est that CAA advise U. S. Customs.

ew World Plane Records

Two new records are now "official" in the oks of FAI (Federation Aeronautique In- rnationale). According to Roger W. Kahn, ce president of NAA, the FAI has officially cepted the world altitude record of 30,203 et set by Caro Bayley in Miami last Janu- y. Miss Bayley established the record in standard two-place Piper *Super Cub*.

The second record to be accepted as of- ial by the FAI was a world altitude record 42,100 feet above sea level for single-place iders. This record was set by William S. ans, Junior, at Bishop, California.

esel-Power License

Taylorcraft, Inc., builder of lightplanes for any years, has been granted exclusive rights Diesel Power, Inc., to install and use diesel engines in lightplanes. Diesel Power claims that an airplane powered by a diesel engine will have the advantage of greater power, less and cheaper fuel consumption, quicker take-off, 40 percent greater flying range, and less danger of fire in case of a crash landing. Development work will begin immediately at Taylorcraft's plant, Conway, Pennsylvania.

Interim Program to Keep 'Em Flying

The Air Coordinating Committee has announced that it has approved and will recommend to the NPA a 90-day interim program of priority assistance to assure necessary spare parts to maintain all existing non-air carrier aircraft in flying status. This program will apply to all U. S. manufactured aircraft, operated both domestically and in foreign countries. This, therefore, insures the owners of some 61,000 aircraft, when applying for priority assistance through their claimant agency, that they will have the endorsement of the ACC for necessary critical parts to keep their planes in good operating condition during this period. The CAA is presently readying a report for ACC with recommendations for the establishment of a long-term program.

Plane Inspection Manual

The CAA is offering a guide for personal aircraft inspection for better maintenance and safer flying. Called "Personal Aircraft Inspection Manual," it is available from Gov't Printing Office for 55 cents. It's worth many times that amount.

ANUARY SHIPMENTS of personal planes added up to 246 by 10 companies, according to A report. This included 153 planes of four place or more, 91 two-place, two one-seaters

	Complete Aircraft		Manufacturer's Net Billing Price	
	Shipments		Shipments	
	January	December	January (thousands	December of dollars)
Aeronca				
Champion 90 hp	4	11		
Sedan	4	2	23	29
7CCM a/	1	--		
Beech				
Bonanza	27	45	767	846
D-18	7	6		
Bellanca				
Cruisemaster	N.A.	4	N.A.	35
Cessna				
140A	12	38		
170A	30	76	336	737
190	6	16		
195	6	11		
Engineering & Research				
G	3	1	10	3
Luscombe - 8-F	8	--	22	--
Mooney - M-18	2	3	4	6
Piper				
Tandem Trainer	60	39	260	134
Pacer	28	11		
Ryan - Navion	45	29	526	334
Taylorcraft				
Sportsman	1	1	2	2
Texas Engineering				
Swift	2	1	7	4
TOTAL	246	294	1,957	2,130

a/ Military type aircraft sold to other than U.S. Military Customers.
N.A. Not available

Engineers

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BONANZAS: 8 from $7250. 1950, B-35, #5458CS, has 143 hours. Painted. Gyros. Loop. Relicensed. New guarantee. $10,300. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

BELLANCA

CRUISAIRS: 17 from $2800. 1949, #6917NS, has 85 hours. Aeromatic. Primary blind. Radio. Stainless mufflers. New. $4400. Inquire, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

CESSNA

170'S: 9 from $3000. 1949, all metal, #9475AS, has 130 hours. Metal propeller. Primary blind. Radio. Excellent. $5200. Consult, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

195'S: 3 available. 1948, #4709NS, has 640 hours. Gyros. VHF. ADF. Marker beacon. Seat chutes. $10,000. Apply, POWERS & GEORGE, Aircraft Brokers, 475 Fifth Avenue, New York City; or, 505 North Ervay, Dallas, Texas.

CESSNA 140 manufactured 1947 metal propeller 2-way radio painted brown. Relicenses to February 1952. 175 hours total A&E. Price $1,925. Airmart Aircraft, 1930 S. State Street, Chicago, Illinois.

CESSNA 140, 1946. 500 hours total time, two-way G. E. Radio. Just painted, will relicense at purchase. $1,450. Airmart Aircraft, 1930 S. State Street, Chicago, Illinois.

CESSNA 170, manufactured 1949, 310 hours total A&E. General Electric 2-way radio. Relicensed to June 1951. Price to sell at $4,995. Airmart Aircraft, 1930 S. State Street. Chicago, Illinois.

CULVER

CULVER CADET Manufactured 1941, 400 hours total 48 hours since engine major, 95 since airframe major. 2-way radio turn and bank rate of climb battery generator starter lights. Painted red and cream. $895. Airmart Aircraft. 1930 S. State St., Chicago, Illinois.

ERCOUPE

ERCOUPE manufactured 1946, 1041 hours total airframe, 200 hours since major, Bendix V. H. F., flashing navigation lights, Auxiliary radio Battery, electric starter, generator. Price $1,195. Airmart Aircraft, 1930 S. State Street, Chicago, Ill.

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Rough-Air Flight

(*Continued from page 42*)

That assistance consists of intelligent piloting during rough-air flight.

Another danger is the tendency on the part of some pilots to dive a plane close to its placarded airspeed and then make an abrupt pull-up. In civilian pleasure flying there is very little cause for a pilot to ever approach a condition of overspeed.

When a cross-country flight is made during turbulent air conditions, airspeed should be reduced in conformity with the manufacturer's recommendations for the specific type of airplane. (Most manufacturers limit cruising in rough air to maneuvering speed which, in the case of the average two-place lightplane, is below 70 mph.) Remember to reduce airspeed, too, when entering an area you suspect offers turbulent air, *i.e.*, over mountain ranges, canyons, deserts, etc., at moderate altitude or at night. Where severe air turbulence is encountered, do not fly at a speed that produces undue engine vibration. A placard in the pilot compartment usually offers this safe-speed information. The lowest airspeed consistent with safety should always be flown in order to permit the airplane to withstand the imposed loads. At the same time, the pilot must watch to be sure he has a margin of safety between flying speed and stalling speed.

Reducing airspeed in level flight by lowering the flaps is not a good idea as a general rule. The lowering of flaps should be in accordance with the airspeed limitations stated on the placard in the plane. Wing-flap structures are designed for take-off and landing conditions, and extension of wing flaps at an airspeed greater than intended not only imposes a high load on the wing structure but also reduces the safety of the wing-flap structure itself. This in turn could cause a critical failure.

For every configuration of gross weight there exists a theoretical cruising airspeed at which some specific degree of high or severe air-gust load might cause a permanent distortion of the wing structural configuration. Severe gust loads can also cause a momentary stalled condition of flight, similar to the condition which also causes high-speed stalls. This is the result of the imposed load created by the air gusts being of greater magnitude than the actual lift force developed by the wing in normal cruising speed. Fortunately, such air conditions are not frequently encountered in routine pleasure or business flying, but they do exist. When the effects of air-gust loads are evident in flight, the plane should be slowly decelerated and trimmed accordingly. This is better than reducing the engine power quickly and then letting the airplane slow of its own accord, with a simultaneous pull-up maneuver to a semi-stall. Gradual deceleration avoids the severe combination of (1) acceleration because of the pull-up maneuver with (2) acceleration caused by the air-gust loads.

Summarizing, there are three general rules:

(1) Do not exceed the plane's placarded and rated gross load.

(2) Do not dive the airplane close to the limited placarded airspeed.

(3) Decelerate the airplane slowly when encountering rough air.

The pilot who follows those rules will add to his enjoyment of flying.

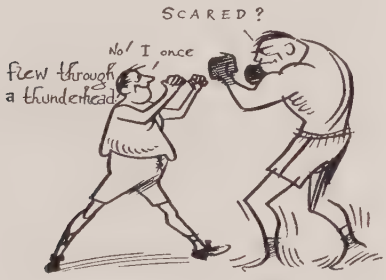
Dilbert

(*Continued from page 34*)

downward motion, during the 20 seconds involved.

This may seem excessive to you, but experienced pilots will tell you this was probably a peewee, or else they only flew through one edge of it. Thunderheads are extremely dangerous, but there are ways to detect and avoid them. Let's review a bit of weather lore.

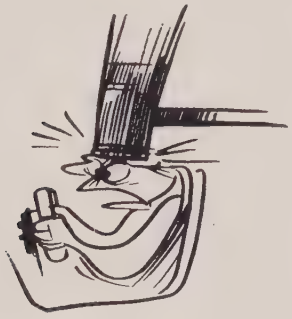
Warm fronts usually consist of a stable air mass, such as that encountered at the beginning of the preceding flight. Of particular interest to pilots is the exception to this rule—occasionally the warm air mass flowing upward over the cold wedge is extremely unstable. This produces that vicious airplane buster-upper known as the thunderhead.



It is impractical to fly above these cumulonimbus clouds, for they extend as high as 35,000 feet. But they can be avoided if their presence is anticipated, and there are two definite clues to their possible existence in a warm front:

1. If you find patches of cirrocumulus ahead of the front—a "mackerel sky"—it is an indication that the over-running warm air of the front is unstable; which means that you are likely to encounter thunderstorms that might be embedded in the warm-front cloud system.

2. Secondly, type and intensity of static on the radio will give positive indication of any active thunderstorms in the area.



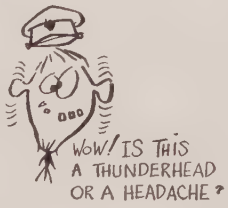
If the above investigation discloses the possibility of thunderstorm activity over your route, make a flight plan that will avoid most of the danger.

a. Get enough altitude while approaching the altocumulus and altostratus deck to get above the overcast. You can then see the towering, anvil-shaped thunderheads, and avoid them.

b. If the overcast covers your own field, and your radio static does not indicate thunderstorms in the immediate vicinity, get your altitude there in a climbing circle, over an area you know.

c. If performance limitations prevent getting sufficient altitude, or if uneconomical on a short hop, stay low, under the cumulonimbus, where you can see them.

d. If other considerations, such as topography or operating limits, prevent a, b, or c, turn back. Or better yet, stay home in the first place.



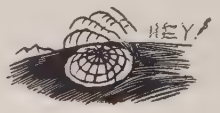
Don't Discard Your Chute—When your engine quits, there are only two things to do: either stick with your plane and try to make a landing that you can walk away from, or bail out right now. That's what this chap did, bail out, only he was from Brooklyn. You see, he landed right in the middle of the Rocky Mountains, and he was scared witless. With reason, too, for his mountain experience was limited to the Jersey Palisades, and his knowledge of wild animals to the bears of Wall Street. He didn't know whether a buffalo or an alligator would nab him first; and in his existing condition, he wasn't even capable of arguing the right-of-way with a rabbit.

So he unbuckled his parachute and ran; no special direction, just fast. He was soon too tired and bruised to be frightened. Hungry, too. When twilight fell, he lay right

down on the rocky mountains, but not for long, for he began to hear strange and ominous noises. He climbed a tree and wedged himself in a triple crotch. This was when he first wished he had brought along his parachute, for padding and later for warmth. He was exhausted, and slept.

Came the dawn, he started out again. He knew planes would be out looking for him today. He would flag them down (what with,

his helmet?!) When the first plane flew over, he was in a spruce thicket, and all he could do was wave his arms and yell. When the ninth one flew over, he was in a

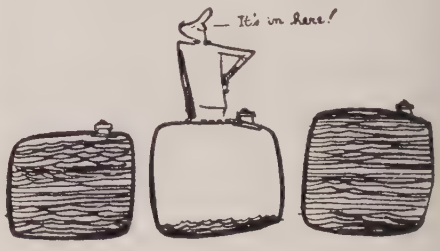


small clearing, still waving and yelling. By now, even he knew he should have saved his parachute to signal with.

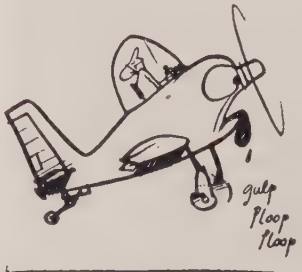
So passed the second day, and the second night; and the third: and the fourth. We are not going into his agonies of thirst, hunger, panic, and more thirst. There is no reason why we should be punished for his ignorance, not only about parachutes but about general survival. It is enough to know that at noon on the fifth day he stumbled into a forest ranger's camp. And what a sight he was—scratched, sunburned, and almost naked! He was incoherent when questioned.

All he could mumble was, "Mus' find my chute," over and over again.

The rangers thought he was crazy, but maybe he was merely reciting his lesson. This one he certainly had learned the hard way.



Dry-Tank Plague—Just to remind you that it is still going on: Dilbert was out practicing tough-and-go landings recently. At the end of an hour and a half, his engine quit and a serious forced landing resulted.



There was nothing finicky or ornery about this engine—it merely died of thirst. The fuel selector valve was found on center main, which tank was empty. Both wing tanks were full!

NAVICOM

ANDB Surveys Current Projects

Mobilization speeds up items in common Program for All-Weather Air-Nav System

The country's general mobilization effort has resulted in a speed-up of certain items in the Common Program for an All-Weather Air Navigation and Traffic Control System. The Air Navigation Development Board has the job of carrying scores of projects through the necessary stages of study, development, experimental tests, and evaluation, in order that the final performance characteristics of the various components may be specified. At this point the operational group picks up the ball.

Transition Program ▶ The general objective of the projects in the Transition Program is to provide aids, not otherwise available, which meet the operational requirements stated by the Air Coordinating Committee and the Department of Defense for the period of time during which the aids will be used, which in general will be through 1953, with many of the aids taking their place in the Ultimate Program.

Certain more specific objectives include:

(1) Approaches to airports in weather conditions of 100-foot ceiling and ¼-mile visibility with adequate safety for aircraft engaged in commercial air operations, and with lower minimums during those military operations in which a lesser degree of safety can be tolerated.

(2) A runway-operation (landing and/or take-off) capacity, for a single live runway of 40 commercial passenger-carrying aircraft per hour under the above weather and safety conditions.

(3) A runway-operation rate for military aircraft, greater than the above, which is limited only by the extent to which uniformity in final-approach speeds of successive aircraft cannot be maintained, and by the longitudinal separation between aircraft which is deemed necessary by the Military Services in the interest of safety of operations.

(4) A landing rate for a Terminal Area with more than one airport which equals the accumulative capacities of the five runways within the area.

(5) Elimination of holding and stacking of a long-term nature, and retention of short-term holding and stacking only to such an extent as is required to obtain maximum utilization of the terminal runways.

Types of Projects ▶ A considerable number of the Transition Program projects are intended to provide improved operation of presently employed aids by correcting objectional features of the aids; others are intended to provide thorough quantitative evaluations of the aids so as to supply information as to the extent to which the operational requirements are met, information for use in further development, and also information concerning the techniques which may be employed to obtain the fullest possible advantages from the aids. Still other projects are intended to provide new aids which may be employed until such time as Ultimate Program aids are available.

The following are some of the projects which have been passed on to ANDB with top priority rating:

1. *R-theta* airborne transponder (radar safety beacon, see *Skyways*, April 1951, page 62). Tests were due this spring, but a change in the band specification by Air Force has caused some delay.

2. Automatic precision approach radar (APAR). This Gilfillan development was originally sponsored by Watson Labs, but was taken over by ANDB. The first model has been installed at the USAF All-Weather Flying Division, Dayton, commanded by Colonel Taylor. Tying in with the auto-pilot, the approach is automatic all the way to touchdown. A typical airborne ILS-type cross-pointer indicator is now in use on PAR approaches.

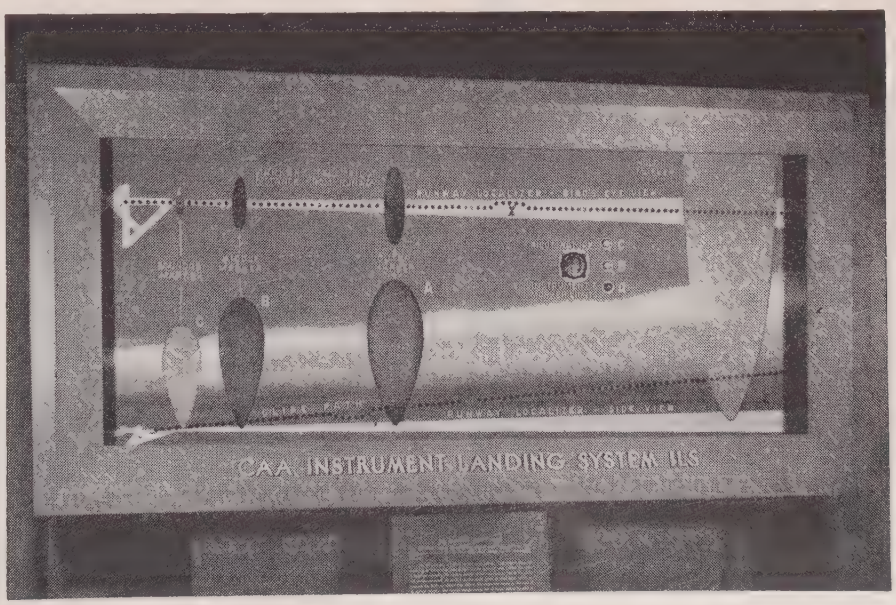
3. Automatic landing flare-out altimeter. Present thinking calls for this Air Force development to take over glide path control from ILS at somewhere between 50 and 100 feet.

4. Small DME sets, one a high-quality unit for transport and military planes, the other an inexpensive, simple DME for private planes, with manual tuning and search. As in the case of the small VOR development, contract for which went to NARCO as a result of competitive bidding, the personal plane DME set will probably be sponsored shortly by CAA.

New Device Extends Use of Lear F-5 Autopilot

According to Bill Lear, two new devices extend the use of the Lear F-5 autopilot to allow unlimited maneuverability and automatic target tracking. Coupling radar devices to the computer of the existing autopilot accomplishes automatic tracking. This will relieve the fighter pilot of much of the physical effort, and its subsequent fatigue, heretofore required in combat tactics.

ILS SYSTEM is expected to undergo much improvement through ANDB development speed-up



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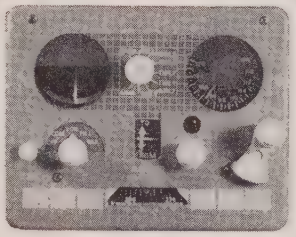

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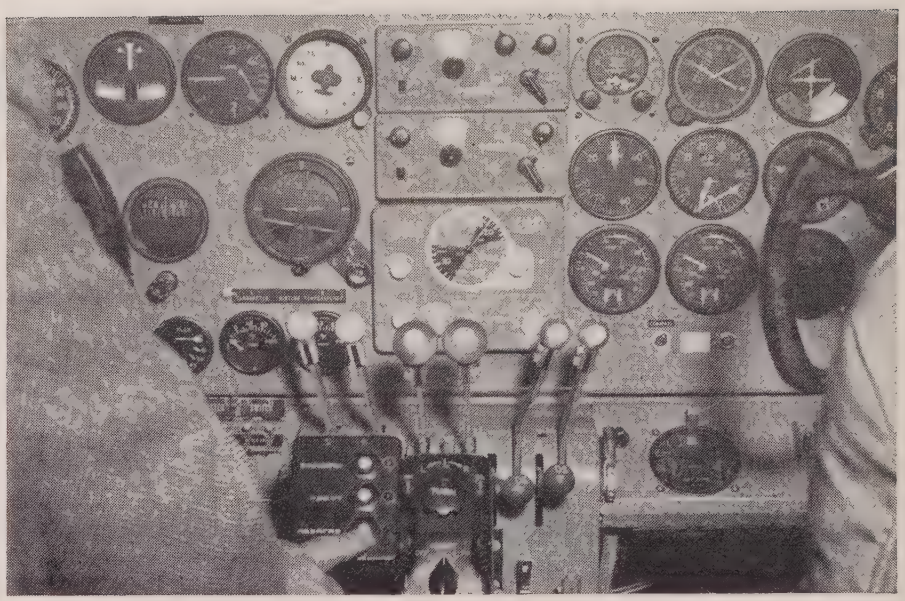


APPROACH CONTROL COUPLER couples three flight controls of airplane to radio signals of ILS through the autopilot. With ACC, plane may be flown in lowest minimums automatically

All-Weather Landing Aid Readied

Lear brings out Approach Control Coupler to be used with ILS; is automatic approach

Several types of electronic equipment have been developed and put into operation to help solve the problem of all-weather landings. One is the well-known GCA radar "talk down" system. Another is the widely used ILS (Instrument Landing System). GCA requires nothing but two-way radio in the plane and pilot's ability to fly ordinary instruments well enough to follow the ground controller's instructions. ILS, on the other hand, requires special airborne instruments, and a high degree of pilot skill.

It is here that Bill Lear has come up with another of his valuable pilot aids—this one known as the Lear Approach Control Coupler. This lightweight, compact unit is in production for the Air Force and is suitable for installation in fighter, liaison or observation aircraft, enabling these types to operate in weather which hitherto would have been impossible. Other approach couplers on the market, such as Sperry's A-12 with Automatic Approach Control and the Bendix Flight Path Control are much heavier, more expensive and suitable for bombers, military and commercial transports and larger executive aircraft.

The main purpose of the Lear Approach Control Coupler is to couple, through the autopilot, the three flight controls of an airplane to the radio signals of the ILS. The basic principle of ILS, as developed by the Bureau of Standards, Dept. of Commerce (now CAA), and the Signal Corps, involves the projection into space of a radio "beam," the instrument indication of which (on cross pointer needles) a pilot can follow. This beam consists of two radio signals. One is known as the localizer and indicates an aircraft position error. The other is called the glide path (now more accurately termed "glide slope"), and indicates deviations from the correct angle of glide to approach the field.

Automatic Approach ▶ With the Approach Control Coupler a plane may be flown in the lowest minimums completely automatically. The correct heading and glide angle will be maintained throughout the approach, the pilot having only to control the airspeed with the throttles, lower landing gear and flaps, and take over for a manual landing when he breaks out into contact.

In operation, the pilot need only approach the field until he comes within range of the localizer beam. This is normally intersected at 45° to 90° angle about 10 miles from the airport. The pilot then pushes the button labelled "Localizer," and the plane makes a coordinated turn into the required heading. (On the experimental unit installed in the Lear Twin Beech [see photo], the first button is labelled "Approach").

The localizer beam is engaged far enough out beyond the field so that the localizer heading is established and the plane is flying level at approach speed before the glide slope beam is intersected, normally about 4 miles from the field.

Correct Glide Angle ▶ As the plane approaches the middle marker, the horizontal bar of the ILS cross-pointer indicator on the instrument panel (the Lear VCIX, upper right hand corner) gradually assumes a horizontal position. When exactly level, the glide slope push button, labelled "Final," is operated and the aircraft automatically assumes the 2½° angle of descent for the standard glide slope installation. All the pilot has to do is to see that the horizontal pointer stays level.

The Lear Approach Coupler's glide slope control is unique in that it utilizes two output signals. The first of these simply causes the plane to nose down from its trimmed level-flight attitude and assume the 2½° glide of the glide slope beam. Since it is this signal which keeps the aircraft in the glide, its removal would cause the plane to return to level flight. As the Coupler is disengaged, just prior to touchdown, the resulting abrupt change of attitude would be particularly serious.

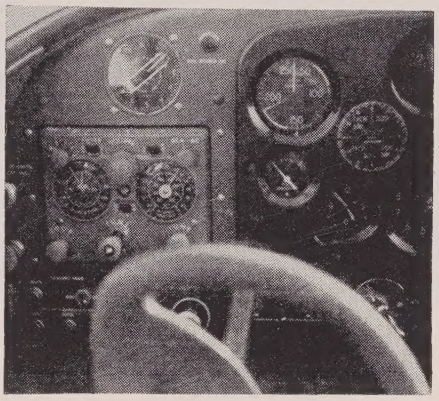
To eliminate this error, a second control signal automatically trims the plane to the glide-slope attitude. With the trim tab automatically preset to a position exactly compensating for existing attitude and speed, the pilot may safely disconnect the Coupler at will, regardless of altitude or attitude.

The production unit was designed to accommodate an aneroid automatic altitude control which is being developed by Lear (see left-hand side of pilot's control box, small photo). An interlocking mechanism prevents the two functions operating at the same time.

The Lear F-5 Autopilot and Approach Coupler currently is being installed in practically all of the new all-weather fighters such as the Lockheed F-94, Northrop F-89 *Scorpion,* North American F-86D, etc. A slightly modified version is expected to be available for executive type or company-operated aircraft using the Lear L-2 personal plane automatic pilot. Arthur Godfrey has one of the F-5's with the AAC installed in his DC-3C and he says "it's just like sliding down a tight wire to the runway—no hands!"

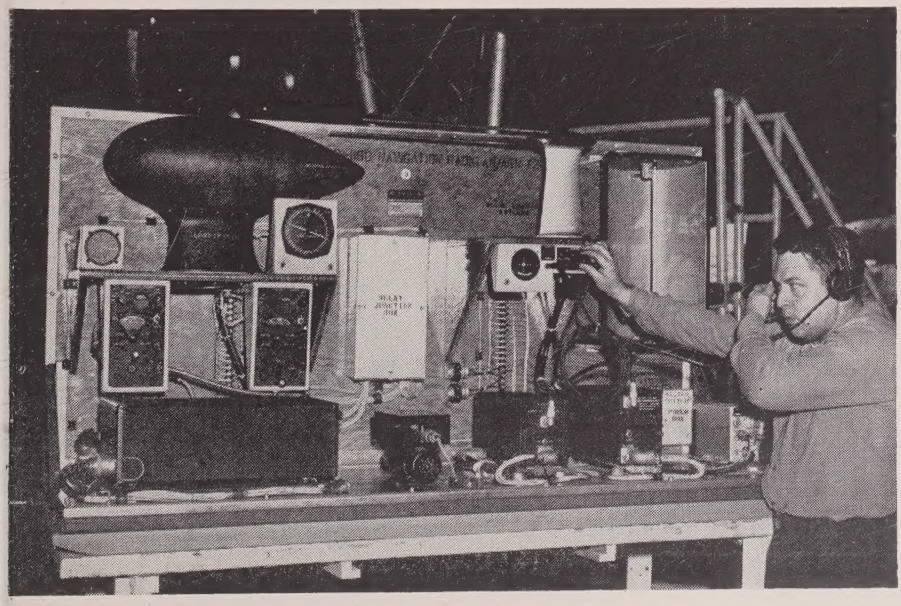
Mitchell Avigator Provides Neat Radio Set-Up

Installation of Mitchell *Avigator* in a Ryan *Navion* is pictured here.

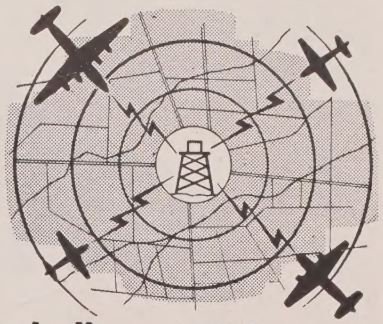


This complete, lightweight radio set for personal aircraft includes VHF transmitter, VHF omni receiver and directional loop & indicator (left); LF range receiver and LF/MF broadcast receiver (right); marker beacon receiver (center switch). Omni bearing indicator, with rotatable parallel lubber lines is shown above these. (For the story of an *Avigator-Navion* flight demonstration see NAVICOM section of April 1951 *Skyways).*

FAIRCHILD employee tests operation of one of the radio training units built by Fairchild for the USAF and Navy. Unit radio equipment is identical with that in a C-119



OMNI's for ALL



and all get OMNI with ARC's VHF Equipment

Pilots of private, executive or transport aircraft enjoy the safety of OMNI with ARC's compact Type 15C VHF Navigation Equipment. It takes the work out of navigation—gives a reliable signal to follow, whatever your bearing to or from the station. No worry about drift, no static interference. Type 15C also provides for use of visual-aural ranges, and runway localizers. All ARC airborne equipment is CAA type certificated and designed for reliability and performance, not to meet a price. Write for all details.

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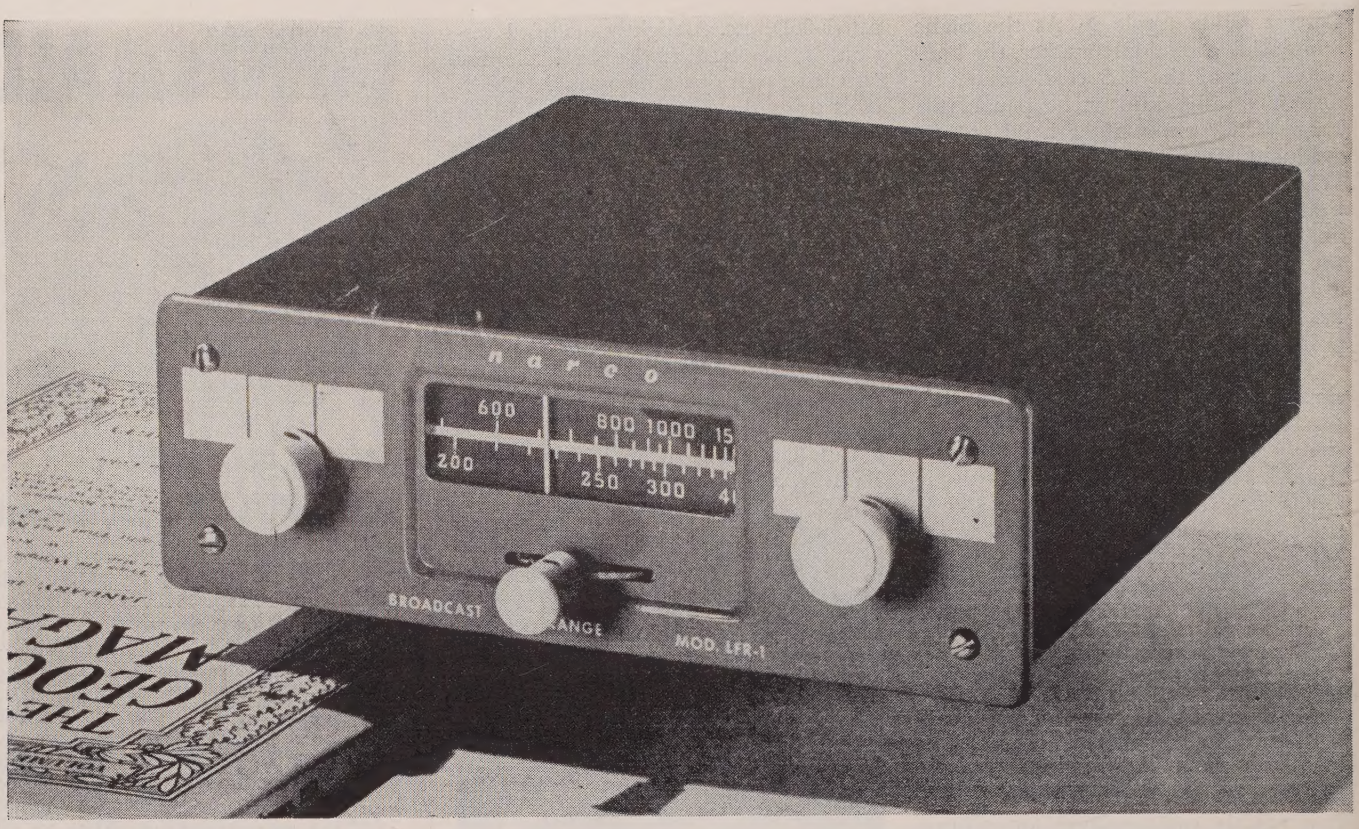


NARCO LFR-1 range and broadcast receiver is being delivered to distributors. New receiver weighs only 35 ounces; sells for $99

New 35-Ounce L/M Frequency Radio Ready for Personal Aircraft Use

A new low/medium-frequency range and broadcast receiver for aircraft has been announced by the National Aeronautical Corporation, Wings Field, Ambler, Pa. NARCO President Jim Riddle stated that limited production of the new unit is under way and that shipments have been made to NARCO dealers throughout the country.

The new receiver, designated LFR-1, weighs only 35 ounces and will plug into any standard NARCO power modulator unit used with the Narco *Omnigator* or VHF communication installation. Separate power supply will be available at extra cost, if desired.

The new radio features a unique "pancake" design. It is only 2⅛ inches high; 6½ inches wide; and 6⅝ inches deep. Therefore, it may be installed in a small space in or below any instrument panel. The electronic circuit of the receiver has seven tubes, including those used in the power modulator unit, and features a germanium crystal diode detector. Extreme selectivity is provided for separating stations. The dial is edge-lighted with a special "Army red" light for minimum fatigue during night operation. The lower scale (200 to 400 kc) is for receiving LF radio range stations; the upper scale (550 to 1600 kc) is for standard broadcasting stations.

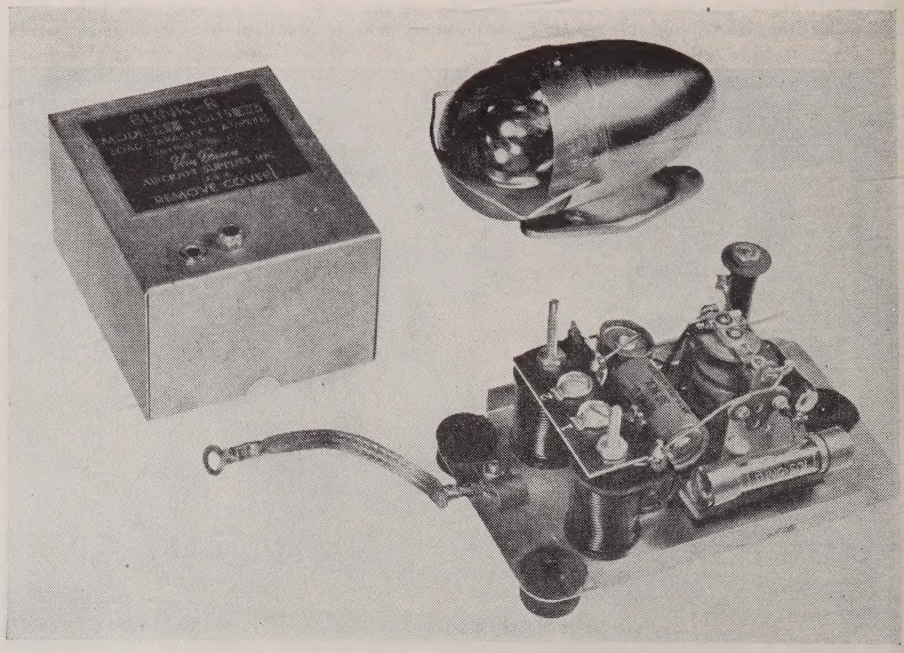
The list price on the LFR-1 will be $99.00, plus Federal Tax.

New Light Flasher

A new, compact navigation light flasher, manufactured for and distributed by Van Dusen Aircraft Supplies (Eastern Div.), Inc., Teterboro, N. J., has been adopted as standard equipment on the Cessna L-19 Army liaison plane. Known as the Blink-R Model BR G-1, the unit weighs only 13 ounces and is approximately half the size of the BR-F model introduced two years ago. The new BR-G-1 measures 3" x 3⅝" x 2" and is easily installed by three rubber grommeted mounting holes.

The new unit produces a flashing rate of between 45 and 60 cycles a minute and is fully shielded to prevent radio interference. It is so designed that in the event of any failure of the mechanism the lights go to a "steady-on" condition. By using a three-way toggle switch on the instrument panel, the pilot can have a choice of flashing or steady lights. The BR-G-1 operates on 12- or 24-volt electrical system.

LIGHT FLASHER is Blink-R BR G-1; weighs 13 ounces; operates on 12- or 24-volt system



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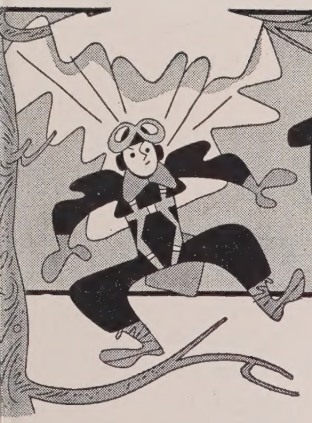
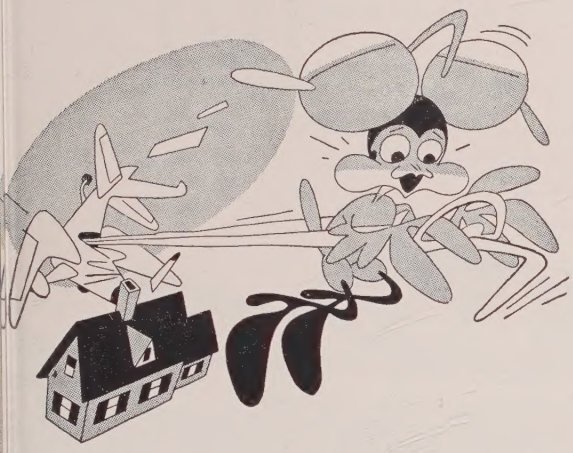


The Birdmen's Perch

old tight, Kiddies, the safety boys are at it again, and as ual making plenty of sense!



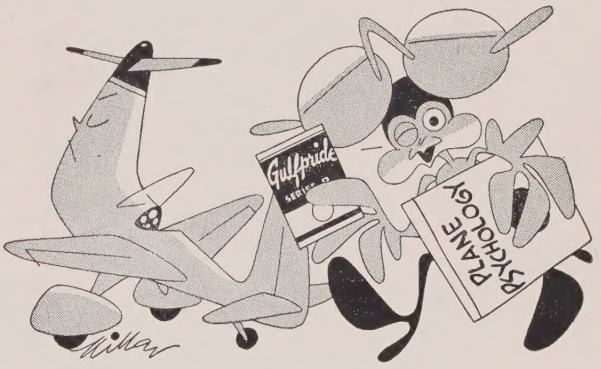
This time it's shoulder harnesses, those ingenious little rices that keep a pilot from folding up like a Parker use Roll if he crashes.

ure, your safety belt will reduce the danger of an accident, it can't hold a candle to a shoulder harness when it comes over-all protection.

Now, let's assume you're coming in for a h landing wearing a shoulder harness. ps, watch that house, look out for those s! CRASH!

ee—what did we tell you! Instead of bling up like a two-bit jackknife, you sat there and let the harness take up most of the shock. And notice, Ferdie, your head's still against the seat instead of bumping against the instrument panel. Hey, Ferdie, speak to me!

But all kidding aside, shoulder harnesses are sure to reduce the seriousness of a good many mishaps!



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Dividends! Why, brother, use Gulfpride Aviation Oil—and increase those periods between overhauls up to 100%! Yes, 100%!

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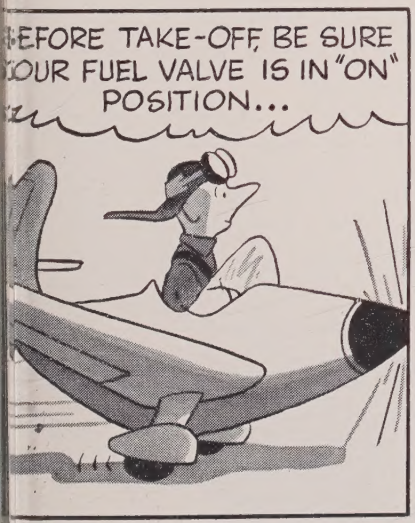
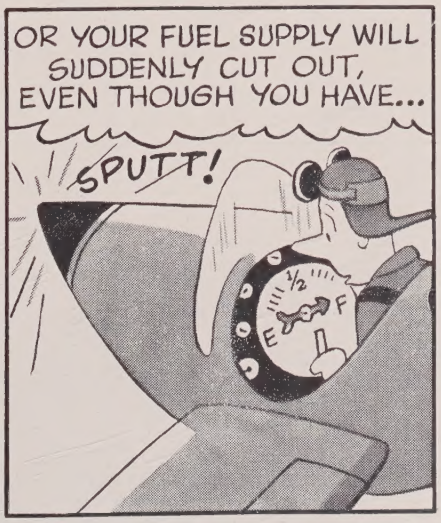
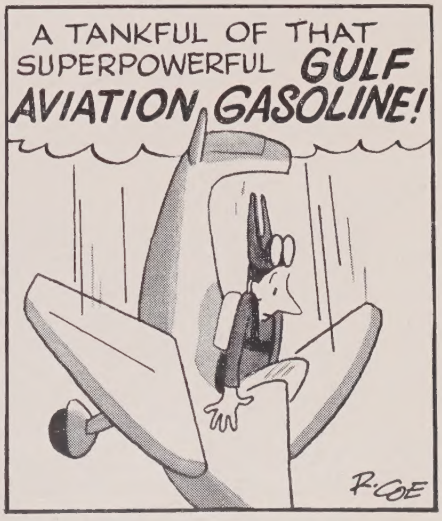




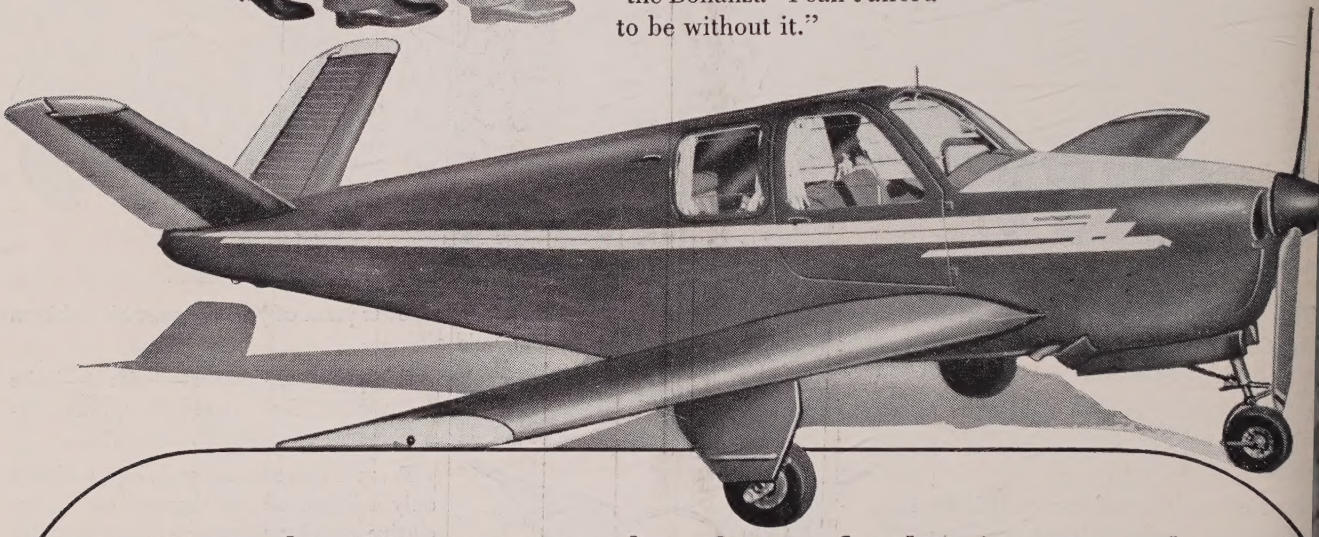


Gulf Oil Corporation . . . Gulf Refining Company

Laurence Arpin leads double life

It's a double *business* life, of course. Mr. Arpin operates a heavy-grading contracting firm on the West Coast, also sells a variety store product all over the U. S. "Managing *two* businesses is possible because of the extra working hours provided by my Bonanza," says Mr. Arpin. "This plane has *doubled* my earning ability.

"Now, after three years of ownership, I realize that not only can I afford the Bonanza—I can't afford to be without it."



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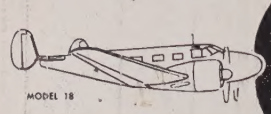

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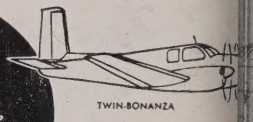

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